TAP TSI and TAF TSI

Sector Handbook for the Communication between Railway Undertakings and Infrastructure Managers
(RU/IM Telematics Sector Handbook)

Submitted on 4th June 2019

Project: TAP/TAF TSI

Date: 4 June 2019

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Hantak, I. Tomekova, S. Naundorf, L. Stenegard, S.
Breu, J. Campo

Owner: RU/IM Telematics Joint sector Group

Client: Sector

### Version:

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<th>Schema</th>
<th>Document</th>
<th>Change</th>
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<td>1.0</td>
<td>Initial – version for review of the sector</td>
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<td>2.1.2</td>
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<td>2.2.3</td>
<td>2.0</td>
<td>Definition of roles, LocoTypeNumber structure change, Location description, High-level process diagrams, other minor changes according to XSD 2.2.3</td>
<td>2019_06_04</td>
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</table>
1. Document History

Document Location
This is the final version of a document, the original version of which is on Christian Weber’s PC only.

This working document will be uploaded to the project extranet (members’ area). The approved document is published on JSG website related to RU/IM Telematics. [taf-jsg.info]

This Sector Handbook has to be accessible to all TAP and TAF actors.

Revision History

Date of last revision: 04 June 2019
Date of next review: 13 December 2019

<table>
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<th>Revision date</th>
<th>Summary of Changes</th>
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<td>V.0.01 26/11/2013</td>
<td>Draft version on basis of Implementation Guide v0.53 and outcomes of Telematic Groups TG1 (Planning), TG2 (Operation), TG3 (IT and Reference Files), TG4 (Train Identifiers) from September 2012 till December 2013</td>
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<td>V0.02 07/02/2014</td>
<td>Draft version 0.02 including some comments received from TGs experts</td>
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<td>V0.03 27/02/2014</td>
<td>Explanation on optional status of new identifiers (chapter 6)</td>
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<td>V0.04 06/05/2014</td>
<td>Aligned with Application Guide v0.06 approved by JSG on 06/05/2014</td>
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<td>V0.05</td>
<td>CW review and inclusion of all comments of TGs. Path Request_ part needs to be reworked</td>
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<td>V0.06</td>
<td>The path request chapter reedited</td>
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<td>2.1.1_v1.0</td>
<td>The results of the review from March 2015 included. Prepared for the final review for 12 November (JSG).</td>
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<tr>
<td>2.1.2_v1.1</td>
<td>The baseline. Error corrections from the TEG review integrated. Schema version incremented due to</td>
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### Approvals

This document requires the following approvals.

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<td>Project Manager, Work Stream Leaders</td>
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<td>RU/IM Telematics JSG</td>
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<tr>
<td>TAP Steering Committee</td>
<td>Chairs, members and alternates</td>
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### Reference

This document is created with reference to the following legal documents.

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<td>TAP TSI</td>
<td>Commission Regulation (EU) No 454/2011 on the technical specification for interoperability relating to the subsystem ‘telematics applications for passenger services of the trans-European rail system and in particular the annexed ERA Technical Document B.30</td>
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**Sources**

This document was created with the input from the TAF TSI Working Groups WG1, WG2, WG3, WG5, WG10, TAP Phase 1 Expert Groups EG1, EG2, EG3 and TAF/TAP Phase 2 Telematic Groups TG1, TG2, TG3, TG4 and TAF/TAP Telematic Expert Groups (TEG) Planning, Operations and TrainID under the leadership of Stephan Breu (DB Netz, DE), Ivana Tomekova (RNE, AT/SK), Helmut Hantak (RNE, AT), Daniel Haltner (Trasse Schweiz, CH), Rik Kapoor (Network Rail, UK), Christian Weber (SNCF, FR), Andreas Abegg (SBB, CH), Sebastian Naundorf (DB Regio, DE), Lars Stenegard (RNE), Josef Stahl (RNE), Jorge Campo (RNE), Seid Maglajlic (RNE), Máté Bak (RNE), Vojkan Stefanovic (RNE).

**Distribution**

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**Specifications**

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<td>Telematics applications for freight subsystem of the trans-European conventional rail system and in particular the annexed ERA Technical Document Appendix F</td>
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<td>Preliminary draft 1.0 of the Technical specifications of Interoperability relating Telematics Applications for Freight (TAF TSI) (Ref. ERA/CON/2013_03/INT)</td>
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Document maintenance

This document will be maintained by the SMO (Sector Management Office).

In the meantime, any actor detecting errors, needing clarifications or proposing additions or updates can contact the SMO via JSG web site contact form.
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3. Management Summary

The Sector Handbook describes messages and elements used by the sector for RU/IM communications for planning and operation in freight and passenger traffic.

Some of these messages are basic parameters described in TAF and TAP regulation. Others are out of the scope of the regulation, designed by the sector for the sector and implementation by the actors under agreement.

The “legal” messages, described in TAF and TAP TSI, will be presented in a separate document called Application Guide. This application Guide is foreseen to replace the document B.56 quoted in the TAP revision text approved by RISC in June 2013 (and corresponding to the Implementation Guide delivered during TAP Phase 1 in May 2012). The decision of replacement will be taken by the Steering Committee co-chaired by the Commission and the Sector. In practice, the Application Guide is the subset of the Sector Handbook relevant for TAF and TAP regulation.

The Sector Handbook is targeted to those people within railway companies and their suppliers, who are in charge of organizing, supervising and/or carrying out the implementation of the TAP and/or TAF RU/IM Communication within their company.

This document explains the TAP and TAF messages derived from both regulations\(^1\), giving a hint on their legal status, explains their usage the overall architecture, the establishment and use of the reference data and relevant code list.

The document covers the RU/IM communication of both TAF\(^2\) and TAP. Some parts are specific to one of the TSIs only and are marked accordingly. The relevant TSI for passenger Railway Undertakings (RU), Infrastructure Managers (IM) and Station Managers (SM) is TAP TSI. The relevant TSI for freight RUs and IMs is TAF TSI.

The messages described in the regulation are completed by optional messages out of the regulations that can be used after agreement by the RUs and IMs (and SMs if relevant) for information exchange. These messages are maintained by the Sector Management Office under the authority of the Joint Sector Group.

Messages described in the Sector Handbook are:

<table>
<thead>
<tr>
<th>Message</th>
<th>Relevant article in draft revised TAF TSI</th>
<th>Relevant article in TAP TSI (454/2011)</th>
<th>Out of regulation (by the sector for the sector)</th>
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<td>Consignment Note data</td>
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\(^1\) Based in particular on TAP ERA Technical Document B.30 and TAF ERA Technical Document Appendix F.

\(^2\) Messages specific to RU/RU communication (relevant only to TAF TSI, e.g. wagon order, wagon movement etc.) are consequently not covered in this document.
### Path Request

<table>
<thead>
<tr>
<th>Message</th>
<th>Section 1</th>
<th>Section 2</th>
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<td>Path Details message</td>
<td>4.2.2.3</td>
<td>4.2.17.2</td>
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<td>Path Confirmed message</td>
<td>4.2.2.4</td>
<td>4.2.17.3</td>
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<td>Path Details Refused message</td>
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<td>4.2.17.5</td>
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<td>Path Cancelled message</td>
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<td>4.2.17.6</td>
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<td>Path Not Available message</td>
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<td>4.2.17.8</td>
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<td>Receipt Confirmation message</td>
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<td>Path Coordination message</td>
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<td>Passenger Train Composition Process message</td>
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<td><strong>Service Disruption Information</strong></td>
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Each relevant chapter describes if the message is required by TAP, TAF, both or if it is a supporting proposal outside the legal requirements.

Related reference data on locations and companies as well as code lists are explained as well.

This document does not cover any requirement on how company internal applications have to be designed or how communication within companies is done. This is up to every company itself.

The document does not cover any Retail specifications derived from TAP TSI.

Apart from the central reference files, this document is not describing specific applications, as neither TAF nor TAP require the use of a specific commercial product.
4. **Who should read what**

This chapter provides a nonlegal binding guideline to the reader of which parts to read.

<table>
<thead>
<tr>
<th>Part A</th>
<th>Train Preparation</th>
<th>Train Running$^3$ (covering real time data exchange)</th>
<th>Path requests (requesting and attributing paths) relevant for RUs and IMs</th>
<th>Reference data relevant for RUs, IMs and SMs</th>
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<td>25</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

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$^3$ Train Running covers the running information, forecast, service disruption, change of track, journey modified, delay cause, information in station and vehicles and train location.
This document covers the implementation of the RU/IM Communication of TAP TSI and TAF TSI. Normally, explanations given are valid for both TSIs (and hence the passenger and freight sector).

- TAP TSI is relevant for passenger Railway Undertakings (RU), Infrastructure Managers (IM) on whose networks passenger train services can be performed and Station Managers (SM). Companies dealing with the implementation of TAP should read all common parts valid for both TSIs and the specific TAP only sections.

- TAF TSI is relevant for freight RUs and IMs on whose networks freight train services can be performed. Companies dealing with the implementation of TAF should read all common parts valid for both TSIs and the specific TAF only sections.

The following applies in this document to distinguish between common information and content valid for one TSI only.

This sentence is valid for both TSIs.

<table>
<thead>
<tr>
<th>TAP TSI only</th>
<th>TAF TSI only</th>
</tr>
</thead>
<tbody>
<tr>
<td>The section hereunder is relevant for TAP TSI only and has</td>
<td>This section hereunder is relevant for TAF TSI only and has</td>
</tr>
<tr>
<td>no impact on TAF.</td>
<td>no impact on TAP.</td>
</tr>
</tbody>
</table>

- This sentence is valid for the implementation of TAP only.
- This sentence is valid for the implementation of TAF only.

By extension, optional messages out of regulation, designed by the sector to be used by the sector after agreement, are allocated to TAP TSI (resp. TAF TSI) column if they concern passengers (resp. freight) traffic.
Part A Prerequisites
5. Background & Purpose of this Sector

The TAP and TAF TSI operational part describes the communication between Railway Undertaking (RU), Station Manager (SM) and Infrastructure Manager (IM). In addition to data exchange, the TAF TSI describes business processes for operational interoperability.

The purpose of these standards is to allow railway companies to order paths for trains, control and manage their train services (and indirectly staff and fleet), and improve customer information provided by RUs and SMs.

The implementation of TAF and TAP TSI is one step towards interoperability. Full interoperability requires further steps besides TAF and TAP, as e.g. different operational rules and organisational set ups are valid in the different Member States, requiring different use of these messages. Gradually, these rules should be aligned.

Various requirements in the Passenger Rights Regulation (PRR) and TAP TSI are the basis for these RU/IM communications. For example, Annex II Part II of PRR requires passenger RUs to inform their customers about delays and main connecting services during their train ride. Basic Parameter (BP) 4.2.12 of TAP TSI requires SMs to inform passengers about material delays, change of track or platforms, full or partial cancellation of trains and train rerouting. In order to give this information, data exchange between IMs, RUs and SMs is needed, covered by B.30 of TAP TSI. The supporting processes of ordering train paths and informing the IM about the readiness of a train are covered as well, facilitating the interoperable train run for RUs.

There are common functions for planning and operations that are cited in both regulations and are common or similar to both TAP and TAF actors. These functions are:

Common System Components:
- Common Interface (TAP BP 4.2.21; TAF BP 4.2.14)
- Reference Files (TAP BP 4.2.19; TAF BP 4.2.12)

Common/similar messages (or groups of messages):
- Train Running Information (TAP BP 4.2.15; TAF BP 4.2.4)
- Train Running Forecast (TAP BP 4.2.15; TAF BP 4.2.4)
- Service Disruption (TAP BP 4.2.16; TAF BP 4.2.5)
- Train Preparation (TAP BP 4.2.14; TAF BP 4.2.3)
- Path Request⁵ (TAP BP 4.2.17; TAF BP 4.2.2)

⁴ For RU/IM an “interoperable” train service is understood as a train that involves more than one IM and/or more than one RU.
⁵ And IMs, in case they provide services as a station manager or in direct communication to passengers.
Specific to TAF are certain parts of train preparation\(^7\). Specific to TAP are messages intended for customer information.

The application of the Common System Components should be used by both TAF and TAP communities for the operational RU/IM communications. Therefore, the related standards and specifications are being aligned.

The Common Messages are based on operational business communications that are also common to the TAF and TAP communities. These operational messages are contained in the message catalogue and have been aligned between TAF and TAP working groups so that they include certain functionality needed in the Passenger and Freight domains.

This implementation guide provides the necessary information to actors of both TAF and TAP to assist in the implementation of the RU/IM functions of both TSIs. The document integrates all parts relevant from the RU/IM part of both regulations in one single guide. It covers prerequisites, such as reference data, the planning part, the operational part and general requirements, e.g. on data quality. Where necessary the document refers to further specifications relevant for the use of the message exchange and described elsewhere. It has to be assured that these referenced documents relevant for implementation are accessible to all actors in a fair and transparent manner.

This document also shows the remaining differences between freight and passenger specific processes and/or data according to business needs.

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\(^6\) In TAF TAP regulation, Short Term Path Request (STPR) is covered. However, it is a general agreement within the Sector to use TAF TAP messages framework for the Path Request process (including annual timetable).

\(^7\) The Infrastructure Restriction Notice database is specific to TAF and not covered in this document.
6. RU/IM Architecture

The following graph shows the general architecture of the RU/IM communication.

Companies’ legacy systems will be linked via an open network\(^8\) (the use of private networks is possible, too), using a common interface (CI). The Common Interface describes a set of functions that are legally required in order to take part in the RU/IM communication.

According to TAP TSI these are:
- message formatting of outgoing messages according to the metadata,
- signing and encryption of outgoing messages,
- addressing of outgoing messages,
- authenticity verification of incoming messages,
- decryption of incoming messages,
- conformity checks of incoming messages according to the metadata,
- handling the single common access to the various databases.

This list is not exhaustive.

\(^8\) Any application commonly used by some parties can also be linked (marked CUS in the image). A CUS can be a system that is used on agreement by more than one party to commonly address data exchange according to or additional to TAP and TAF TSI. CUS are not a requirement from TAF nor TAP TSI.
The solution to cover the functions of the common interface used by a company can be either a commonly built CI\(^9\) or another development with the required functions. In case a company (in the picture: RU 3) develops and builds new applications, the message exchange can directly be according to TAP and TAF TSI, with no additional application (separate interface) needed. The required functions of the Common Interface (as described above) will have to be covered by this application directly. (In case the new application does not support TAP and TAF messages and/or the functions of a CI, a common interface is still needed.)

A company’s CI will have to be in accordance with the external interface specification, describing the communication between CIs. That external interface specification of the reference implementation can be found on the website of the European Commission (ERA_TD_104): http://www.era.europa.eu/Document_Register/Documents/ERA_Technical_Document_TAF_D_2_Appendix_E_v2_0.pdf

Common reference data (as described in chapter 9) including location codes, company codes and country codes are stored centrally, with different possibilities to access them (e.g. messages, bulk data load, web interface). RUs and IMs will need to have a current subscription to the TAP/TAF governance entity to be given access rights to the reference data service.

Common code lists are enumerated values that are available to be used within the RU/IM messages. These codes are to be used unless a bilateral agreement exists between partners to use other codes. These common Code Lists are published centrally by ERA for the codes messages required by the regulation and by Joint Sector Group _ sector RU/IM Telematic governance entity for the codes used out of the legal TAP/TAF requirements.

Reference data and code lists are mirrored in the companies’ systems (see chapter 9.3 for ways to access the data), i.e. each actor holds a copy of the reference data in its own system environment.

The exchange of bilateral and multilateral agreed messages remains possible as well. This covers the use of both messages and codes in the TAP and TAF messages.

In the further document, the references and excerpts of the XSD schema (the metadata definition for TAF TSI messages) are used, and often in the form of graphic models. The syntax of the model used in the pictures through the document which reflect the message or element structure is described in the Annex 6.1. The full export of the XSD model in the “readable form” including diagrams and cross-references is given in the Annex 6.2. The code lists are exported in the readable form in the Annex 6.3.

\(^9\) e.g. the CI developed initially under the supervision of the Common Components Groups (“CCG CI”).

Update 2017: It is now called “Common Components System (CCS)” under the umbrella of RailNetEurope
7. End to End Processes

This chapter provides an overview on the main end-to-end process covering planning and operations. The details or any other associated processes (e.g. path cancellation) can be found in the individual chapters (see section 12.5).

7.1 Definition of the roles

Lead RU (Railway Undertaking)

The Lead RU is responsible for coordination of an interoperable traffic service and train journey. It is not necessarily the first RU at the origin of the planned journey of the train. The Lead RU undertakes the harmonization and coordination in the pre-planning phases and the whole communication between involved RUs. For freight traffic, the Lead RU may be the single point of contact of the customer.

Among the tasks of the Lead RU are: the creation of the object train, the definition of TrainID and assurance of its uniqueness. The Lead RU may be RA (responsible applicant) and/or a RRU (responsible RU) as well. If that is not the case, the Lead RU has to inform that both other roles if they are taken by other RUs. In principal, in such a case the communication exchange takes place primarily between Lead RU and RA. Communication exchange between Lead RU and infrastructure manager (IM) is optional; no special rights and obligations to the IM.

Legal reference:
EU Regulation No 1305/2014 (TAF), p10, §2.3.1 Involved Entities

Responsible Applicant (RA)

Applicant means a railway undertaking or an international grouping of railway undertakings or other persons or legal entities, such as competent authorities under Regulation (EC) No 1370/2007 and shippers, freight forwarders and combined transport operators, with a public-service or commercial interest in procuring infrastructure capacity (Directive 2012/34/EU (3)).

The RA is the applicant/customer and contractor as well as the single point of contact for respective IM in the whole planning process phase. The main task of the role RA is to request the booking of capacity to an IM. The RA does not need to be a RU, it can also be another entity, which is able and permitted to book capacity.

The RA (if it is an RU) may take the roles Lead RU and/or RRU as well. If that is not the case, RA has to inform the both other roles if they are taken in by other RUs. The RA has to create a Path Request and a PathRequestID to request for a desired path in network of a particular IM. If it is not an interoperable train managed by a planning Lead RU, the RA also creates the object train, the TrainID and assures the uniqueness and takes the Lead RU role too. Furthermore, the RA is allowed to confirm or to refuse a path offer, to book a path (sign the contract), to change or to cancel the booked path.

Legal reference:
EU Regulation No 1305/2014 (TAF), p10, §2.3.1 Involved Entities & Appendix II, Glossary
EU Regulation No 454/2011 (TAP), §8 Glossary: mentioned as "Access Party"

Responsible RU (RRU)

Railway Undertaking (Directive 2004/49/EC (9)) means railway undertaking as defined in Directive 2001/14/EC, and any other public or private undertaking, the activity of which is to provide transport of goods and/or passengers by rail on the basis that the undertaking must ensure traction; this also includes undertakings which provide traction only;
Based on this definition, this TSI regards the RU as the service provider for operating trains.

The RRU is responsible for the run of the train in operation phase, for the whole journey or a section of the journey. It is the service provider for operating trains, i.e. which task is to provide transport of goods and/or passengers by rail.
If more than one RRU is involved in the operation of the train, the responsibility is transferred from one RRU to the next RRU at the interchange point.
In this context the RRU is the primary contact for the IM in operation phase, for all exchange of information related to the running of the train (e.g. train running information forecast, change of track, etc.) as well as the tasks required for incident management (e.g. coordination with the IM in case of a line closure, technical malfunction). If required by the necessity of the service and depending on specific network statement, it is for the operations phase also allowed to perform tasks like confirming a path offer for an alteration of a booked path by IM, to change or to cancel the booked path (depending on specific network statement or agreement with RA).
Based on an agreement with RA, it can also ask a subcontractor with running the train, the RRU will nevertheless remain the primary point of contact for the IM in operations phase.
If there is a need to communicate a subcontractor, this can be done outside TAF/TAP TSI communication. If bilaterally agreed, the update of the element RRU is also possible. In principle, the RRU may be the same RU as for roles Lead RU and RA. If that is not the case, RRU has to inform the both other roles if they are taken in by other RUs.

**Responsible IM (RIM), Planning IM (PIM)**

The RIM is the IM who is the owner of the respective network and responsible for all operational handling of the traffic. The PIM is the IM who is responsible for elaboration and allocation of a path. The responsibility area of PIM is defined by handover points, e.g. used as first/last journey location in PathInformation of PathRequestMessage or of an offered/booked path.

In most cases, the RIM will be the same entity as the PIM. However, for some locations and/or some trains, traffic monitoring in operations may also be delegated to another IM. For this purpose, special agreements must be concluded between IMs. If they are different, the RIM is always defined by the PIM when the path is allocated.

**Summary of the roles**

<table>
<thead>
<tr>
<th></th>
<th>Lead RU</th>
<th>Responsible Applicant (Contractor)</th>
<th>Responsible RU (responsible for train run)</th>
<th>Planning IM (Planner and owner of the path)</th>
<th>Responsible IM (responsible for monitoring operations)</th>
</tr>
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<tbody>
<tr>
<td>Harmonisation/Coordination</td>
<td>R R I</td>
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<tr>
<td>Path request</td>
<td>I R R</td>
<td></td>
<td>R</td>
<td></td>
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<tr>
<td>Path allocation/confirmation/ booking</td>
<td>I R</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Path cancellation</td>
<td>I R R</td>
<td></td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Path modification in planning</td>
<td>I R</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Path alteration in planning</td>
<td>I R</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Path modification in operations (1)</td>
<td>I I R</td>
<td></td>
<td>I R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Path alteration in operations</td>
<td>I I R</td>
<td></td>
<td>I R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations messages RU &gt; IM</td>
<td>I I R</td>
<td></td>
<td>I R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Depending on specific network statement or agreement with RA.
(1) If IM allows modification in operations phase
(2) No TAF-TAP message exchange

| Sender may send messages to more than one recipient but „R“ is mandatory and responsible. |

**7.2 High level overview of the processes**

**Main flow (planning)**
Lead RU find demand for a train services (same for passenger and freight), or customer makes requests for a service.

If partner RUs have to be involved for this service, Lead RU contacts and coordinates the work with them.

The Lead RU prepares a draft planning for this service. If needed, the Lead RU aligns this planning with partner RUs (“RU harmonisation”).

For each involved network, a licensed RA makes a request for a path for either overall journey or a section of the journey to the respective IM.

The possibility exists for IMs to coordinate the different sections of the journey (“IM harmonisation”).

IM offers path(s) based on the PathRequest back to the RA.

RA confirms or negotiates with the IM if changes are required until an agreement is reached between RA and IM (this could be for the whole journey or just a section).

Upon agreement the IM confirms the path in its system (booked train).

The booked train is confirmed in the RAs system for production and also in the RAs’ and Lead RU’s system for commercial information.

**TAP TSI only**

This might involve publishing the train in the commercial timetable, making the service available for e.g. booking, reservations, publishing the timetable in

**TAF TSI only**

This might involve publishing the train in the timetable and offers for freight forwarders.
stations etc. Related processes and standards are related to the Retail part of TAP TSI and can be found in the dedicated retail Implementation Guides.

Subject to contractual agreements between RU, SM, affected RAs and IM or according to national rules, the Lead RU shall transmit relevant technical characteristics (train composition, etc.) and commercial information (offered services, etc.) to the SM and/or IM and/or affected RAs necessary to operate the train and provide passenger information. This information is out of TAP obligations. An optional message can be used. [See §]

The data and identifiers agreed in planning have to be transferred into operations.

**Main flow (operations)**

<table>
<thead>
<tr>
<th>TAP TSI only</th>
<th>TAF TSI only</th>
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</thead>
<tbody>
<tr>
<td>The section hereunder is relevant for TAP TSI only and has no impact on TAF.</td>
<td>This section hereunder is relevant for TAF TSI only and has no impact on TAP.</td>
</tr>
</tbody>
</table>

Subject to the contractual arrangements between Lead RU, SM, RAs, and IM RRU, IMs and according to national rules. The RRU shall be required to send the composition to IM and/or to SM and/or to RAs at the time of train operation. This information is out TAP obligations. An optional message can be used. [See § 13.1]

In TAF, the process of sending the train composition from RRU to IM and its validation by IM may be required (depending on contractual agreements between IM and RRU or according to national rules). The RRU in operation must send composition to the

Before the train accesses a network, the Responsible RU informs the affected IM on the readiness of the train to run the booked path on that network.
Subject to the contractual arrangements between Lead RU, SM, RRU
ts and IM and according to national rules.

- The RRU shall inform the IM (and when relevant the involved RAs or the SM) prior to departure and during the journey of any rolling stock restriction affecting the ability to accommodate the allocated path.
- Subject to the contractual arrangements between RU,
SM, involved RUs and IM and according to national rules. The RU shall inform RAU(s) or SM(s) of any modification or anomaly affecting the services provided to the passengers.

This information is out of TAP obligations. An optional message can be used. The optional Passengers Train Composition message can also be used.

The train starts running and train running information is sent from IM to RRU at agreed reporting points. Forecasts are sent from IM to RRU and also to neighbouring IM involved for agreed forecast points, which could also be before the train starts running.

Depending on contractual arrangements, the IM may also send running information to RAs and Lead RU.

For TAP, the train running information and forecast are also forwarded to Station Managers.

In case a train will not arrive on the scheduled track/platform to allow passengers to alight or leave the train, the information of change of track is issued to the SM (to inform the passengers in the station). Note that the message Change Of Track/Platform is optional and out of TAP regulation.

In case the train running is interrupted with no forecast possible, the IM informs the RRU on the train running interruption. Communication (not TAP/TAF message supported) between RRU and IM takes place to agree on the continuation of the train.

Delay cause messages are used to identify the cause of every single delay affecting the train run.
**TAP TSI and TAF TSI**

**RU/IM Sector Handbook**

Submitted on: 04/06/2019

<table>
<thead>
<tr>
<th>TAP TSI only</th>
<th>TAF TSI only</th>
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</thead>
<tbody>
<tr>
<td>The section hereunder is relevant for TAP TSI only and has no impact on TAF.</td>
<td>This section hereunder is relevant for TAF TSI only and has no impact on TAP.</td>
</tr>
<tr>
<td>The train running information and delay causes are used for passenger information, passenger rights handling and performance regimes.</td>
<td>The delay causes are used to inform the customer and for performance analysis.</td>
</tr>
</tbody>
</table>
8. New identifiers

8.1 Introduction

The aim is to have a unique ID for all objects over their complete lifecycle. The lifecycle starts with the planning phase until the phase of accounting. Identifiers in the messages for TAF as set out in Commission Regulation (EC) No 62/2006 and TAP as set out in Commission Regulation (EU) No 454/2011 (as amended by Commission Regulation (EU) No 1273/2013) as well as further industry needs have been analysed and are specified hereafter.

The problems of the identification of trains have been an issue since the early days of the railways. This can be borne out by the considerable amount of time it has taken to complete. During the analysis of the message exchange in TAF/TSI and the existing international systems it became apparent that identifiers for almost all of the elements involved in the transport process are needed. Today’s identifiers (and also the operational train number, in the further text the abbreviation is used: OTN) are not able to cope with the new business processes. More precisely, all IM’s and RUs use some form of train number or train description to identify their trains to operational staff. Depending on the country this code can be used to perform a number of different tasks. This can include information such as a speed of train, priority, route, direction, running order, timetable and some special needs (such as exceptional loads or hazardous goods). If this information changes the train’s number (OTN) must also be changed. While the majority of trains will keep the same number for their entire journey this can often make it worse for the occasion where the number is changed as the company procedures for handling the changes are “ad hoc”. That’s why the train could be lost.

8.2 Solution guideline for the industry

The intentions of the industry are:

1. To create and develop the recommendations and specifications for the coding of Train ID and the other TSI identifiers
2. To find a solution for medium and long term

8.2.1 Business environment (background)

The solution is based on the available documents from TAF/TSI regulation 62/2006, TAP/TSI proposal, and the results of the other TAF/TSI working groups showing that one of the key elements required for the majority of the message types is a “Unique Identifier” that relates to the train from the business perspective and the link to the path can be managed in a standardized way.

It does not take into account any newer developments of regulations, e.g. the new EU directive 913/2010 from 22/09/2010.
In principal the solutions have been designed to be flexible to allow it to be used to meet new regulations as well.

Identifiers in the messages for TAF/TAP and further industry needs have been analysed and are represented in this chapter.

Important note: Both ERTMS/ETCS and GSM_R remain untouched by the proposed solution.

**Business change**

It is important to mention that the split of the Railway business, according to the Regulation 2012/34 had as a consequence the split of the IMs from the RUs. The business focus of each separate company changed. The actual situation is the result of several previous steps over the last years. Driven from the split of the national railway companies (see number 1 in Fig. 1) in the 1990ties a consequence is that the existing IT systems (number 2 in Fig. 1) were distributed to the two or more new companies (Infrastructure Managers and Railway Undertakings).

The scope of the companies differs:
A RU supplies a service (train) for a customers' applicants' need (transport).

An IM responsibility is to manage the capacity of its network (path).

Together with the split of the companies and the separation of the systems new processes have been developed to cope with the new situation. These processes are based on new (separated) data objects “Path” and “Train” (number 3 in Fig. 1). In former times a data object “Trainpath” has been used in the systems. The consequence was the need to separate into two objects: “Train” and “Path”. In the communication between RU’s, RU and IM, IM’s these separated data objects must be uniquely identified (number 4 in Fig. 1). A new data model has been developed to deal with the changed situation described in TAF/TAP regulation and the results of the other working groups. The new model needs (new) identifiers. Those identifiers are described in this chapter of the Sector Handbook.

8.2.2 Requirements

When establishing this concept, the following high-level requirements have been taken into account:

2. Need for identification:
   A new model for identifiers is needed for some of the existing objects in the railway business.

3. Coverage of the whole business process
   The future solution must support all existing railway business processes starting with the end customer request for transportation until the accounting phase.

4. Compliance with the results of the other working groups
   The solution must be in compliance with TAF/TSI regulations and the changes coming out from the TAF/TSI working groups WG2, WG3 and WG5.

5. Existing identifiers remain
   Given the need to maintain compatibility with existing systems and infrastructure it was concluded that the usage of the operational train number must be kept “as is”. Each IM would set it in accordance with its national rules and safety standards. International trains could continue to follow UIC leaflets 419_1&2.

The detailed requirements analysis had as a consequence the following demands:

- The identifier must be unique for the planning phase.
- The identifier must be unique for the operational phase.
- The identifier must work for both domestic and interoperable trains.
- The identifier must support splitting and joining of trains.
- The identifier of the train must remain the same when a train is diverted, delayed or disrupted in any way.
- The operational train number should be retained as used today, e.g. in operations within both IMs and RUs. (In the Annex 8.1 (OTN Framework), there is an explanation of the usage of OTN in TAF messages, related to the TAF objects and identifiers).
• The identifier (in combination with the new business rules for the implementation of the Train ID) must allow operational train number to be changed in transit and guarantee traceability.
• There must be a separate path identity, controlled by the IM.
• The identifier must be unique on its own. It doesn’t rely on data to meet this requirement.
• The format of the core part of the reference is decided by its creator (subject to the rules set out in this document).
• There should be as few rules as possible about format for not constraining the future use of the reference.
• The identifier has to cover the whole lifecycle of the referenced object.

8.2.3 Objects

It has been agreed on the level of the working groups which produced this result to use the data analysis techniques developed by the IT industry for designing databases. Computer systems can be made to do very difficult things but only if they are designed correctly. Computer systems often have to deal with complex pieces of information. The analysis process involves understanding the data in its simplest forms and the relationships between the different bits of information. In this process the “Data” is normally information about something. This something is called an “Object”. In the IT industry this may also be called an “Entity”, a “Class” or a “Class Object”. In databases it may be called a table. For consistency in this document it will always be called an “Object. In order to keep track of objects, an identity (ID) has to be defined for them. The ID needs to be a name or code for each time an object occurs which “uniquely” identifies each instance of an object.
The main “Objects” identified in this chapter are:

• Train
• Path
• Path Request
• Case Reference

8.2.3.1 “Train”

The train object first comes into existence at the earliest planning phase when the RA starts to develop plans to run a train. The Lead RU creates the identification for the train at this stage. The Lead RU will then go through a harmonisation process with all RAs involved in the particular business case. They will then apply for paths to run the trains. The attributes of the object Train are:

- Train route (geography, journey sections / locations, timing, indication of responsible RU and IM)
The locations to be defined for the train route shall be at least:
  - origin of the train route
  - border points (Handover points, Interchange points)
  - destination of train route
Train parameters (weight, length)
Train calendar

Shown here is the minimum requirement from the technical point of view. The technical
details of the object Train are given in the XSD structure (see the current TAF/TAP XSD
Schema / data catalogue – see JSG web site http://taf_jsg.info/) within the element
TrainInformation.

8.2.3.2 Path

In response to Path Request(s) issued by RA, the IM will offer Path(s) or reject the Path
Request(s). The IM will need to create an ID for this Path. It may also offer a number of
paths each with their own IDs.
The attributes of the Path object are:
- Geography – Journey(path) sections / locations, timing, indication of the
  responsible IM
- Path parameters
- OTN for each section of path (journey)
- Calendar

Shown here is the minimum requirement from the technical point of view. The technical
details of the object Path can be found in the XSD structure (see the current TAF/TAP
XSD Schema / data catalogue) within the element PathInformation.

8.2.3.3 Path Request

In order to get a Path for a Train, the path request has to be issued. Therefore, the Path
Request is an object in its own right with a separate ID. The technical attributes of the
Path Request object are contained in the Path Request Message in the current TAF/TAP
XSD Schema / data catalogue (the message header elements which are used for all
messages in TAF/TAP are excluded from the model).

8.2.3.4 Case Reference

This object heavily depends on the agreements between the partners that exchange the
information with the means of TAF/TAP messages in the industry. The object is here
mentioned for the purpose of:
- Umbrella for the business case: The cases where the partners want to provide an
  identifier as an umbrella for the whole business case which is handled in the
  process of organizing the Train, sending the Path Requests for it_ and
  constructing, offering and keeping the track on Path for it.
- Transaction scope: this identifier is used in a sequence of actions that have to be
  started, processed and ended as a whole.
- Differentiation of parallel applications: All the (re-)planning activities to be
  processed in parallel have to be differentiated by using this identifier.
Therefore, the structure of this object is not further defined in this document, as mentioned before, it rests on the agreements between the partners in the industry.

8.2.3.5 The difference of IDs for objects in planning and operational phase

When a RU creates a train and an IM a path it may be for a single day or a number of days. In the planning phase the object (train and path) will have a calendar as an attribute to indicate which days it operates. However, when the object is used in operation each object (train and path) on each day needs a unique ID. For this reason, the objects and the format of their IDs come in two forms:

1. The Planning object (with the ID of the planning object without the start_date) and

2. The Daily (operational) object (with the ID of the planned object enlarged and made unique with the start date).

8.2.4 IDs

In order to standardize the structure of IDs for the TAF/TAP the following format has been chosen with a specific field for the object type.

8.2.4.1 Standardized Structure

Basically, the structure is made in a generic manner, and the identifier is constructed as a “composite” of several elements.

1. Planning:
In the figure above, the elements of the composite identifier for the objects in the planning phase are shown. The details about the elements are provided below.

2. Operation:

- **Figure 1 Composite Type for Planning objects**
• Figure 2 Composite Type for identifying of “daily” (Operational) objects

In the figure above, the composite identifier type which should be used in the operational phase is shown. The elements for building of the composite are described below.

**Elements of the composite structure**

8.2.4.2 Object type

A two-character element indicating the type of object this ID is for. This object is necessary to ensure that the IDs for different objects are unique between them. It also allows a person or system to easily recognise the type of object the ID is for.

The object type is a fixed length of 2 alphanumeric characters: It can use any digit from 0 to 9 and any upper-case character from A to Z. It cannot be shortened to 1 character and cannot use any punctuation or spaces.

Enumeration:
- TR for Train
The object types are managed by the SMO to ensure their correct application. In the XSD schema, it looks as follows:

```xml
<xs:element name="ObjectType">
    <xs:annotation>
        <xs:documentation>Provides a possibility for differentiation between the objects: Train, Path, Case Reference and Path Request</xs:documentation>
    </xs:annotation>
    <xs:simpleType>
        <xs:restriction base="xs:string">
            <xs:minLength value="2"/>
            <xs:maxLength value="2"/>
            <xs:pattern value="[0-9A-Z]{2}"/>
            <xs:enumeration value="TR"/>
            <xs:enumeration value="PA"/>
            <xs:enumeration value="CR"/>
            <xs:enumeration value="PR"/>
        </xs:restriction>
    </xs:simpleType>
</xs:element>
```

### 8.2.4.3 Company

A four-character element is indicating the company who created the object. By prefixing all IDs with the company ID, it allows the company to use its own code and still ensure the ID is unique. The company codes to be used will be the current standard set down by the TAF/TAP. These codes are made up of only numbers at the moment. In the XSD schema, it looks as follows:

```xml
<xs:element name="Company" type="CompanyCode">
    <xs:annotation>
        <xs:documentation>Identifies a railway company (RU or IM)</xs:documentation>
    </xs:annotation>
</xs:element>
```

Please note that the type CompanyCode corresponds to the RICS (UIC) coding structure and should be mirrored if RICS coding changes:

```xml
<xs:simpleType name="CompanyCode">
    <xs:annotation>
        <xs:documentation>Identifies the RU, IM or other company involved in the Rail Transport Chain</xs:documentation>
    </xs:annotation>
    <xs:restriction base="Numeric4_4">
        <xs:minInclusive value="0001"/>
        <xs:maxInclusive value="9999"/>
    </xs:restriction>
</xs:simpleType>
```
8.2.4.4 Core element

The Core element is the main part of the ID. It is free format and determined by the company that creates it. It can use any digit from 0 to 9 and any upper-case character from A to Z. It is fixed width 12 characters. If it is less than 12 characters long it must be left justified by padding out the remaining space with a horizontal dash “_”.

In the XSD it looks as follows:

```xml
<xs:element name="Core">
    <xs:annotation>
        <xs:documentation>It is the main part of the unique Train Identifier and is determined by the company that creates it.</xs:documentation>
    </xs:annotation>
    <xs:simpleType>
        <xs:restriction base="xs:string">
            <xs:minLength value="12"/>
            <xs:whiteSpace value="replace"/>
            <xs:maxLength value="12"/>
            <xs:pattern value="[\_\0_9A_Z\{12}\]"/>
        </xs:restriction>
    </xs:simpleType>
</xs:element>
```

Rules:

From the technical point of view the content of the core element can be freely constructed by each company involved, by respecting the rule given in the regular expression in the XSD model.

Specific for the Train ID Core Element: For the implementation phase it has to be investigated how the change from the UIC leaflet 419_1&2 procedure to the full working Train ID can be managed. This could include among other for example rules in the core element. During the implementation phase adaptations of the chosen solution must be possible.

For the migration phase, until all stakeholders implement the full support of the new identifiers, it is already proposed in the WG10 Handbook (and endorsed by RU/IM Cluster in 2011) that the community of RUs, the members of the organization Forum Train Europe will use the existing UIC Leaflet 419_1/2 for generating the Core element of the TrainID.
8.2.4.5 Variant

The variant field is a fixed length of 2 characters. It can use any digit from 0 to 9 and any upper-case character from A to Z. It cannot be shortened to 1 character and cannot use any punctuation or spaces.

This is how does the structure look like in XSD:

```xml
<xs:element name="Variant">
  <xs:annotation>
    <xs:documentation>The variant shows a relationship between two identifiers referring to the same business case</xs:documentation>
  </xs:annotation>
  <xs:simpleType>
    <xs:restriction base="xs:string">
      <xs:minLength value="2"/>
      <xs:maxLength value="2"/>
      <xs:pattern value="[0_9A-Z]{2}"/>
    </xs:restriction>
  </xs:simpleType>
</xs:element>
```

Utilization:

See chapter 8.2.4.8 “Uniqueness of the code”.
During the migration phase, if the UIC Leaflet 419_1/2 is used for generating of the Core element for TrainID, it is recommended to fill the variant field with '00', in order to keep the uniqueness of both 419_1/2 number and the TrainID. There is currently an ongoing activity within the sector to overcome these issues in the migration phase.

8.2.4.6 Timetable Year

In order to allow the core element to be reused for different timetable periods the year is included to indicate which year it applies to.

Please note the following example. If a Train, or a Path crosses 2 timetable periods (due to midnight crossing): the year should refer to the timetable period of the departure of the Train or Path.

If a Train starts in timetable period 1 (TTP1) in country A, but crosses the border after midnight (in TTP2) in country B, the following logic should be applied:

- Train object with TTP1
- Path in the Path Request message in country A with TTP1
- Path in the Path Details message in country A with TTP1
- Path in the Path Request message in country B with TTP2
- Path in the Path Details message in country B with TTP2

The IT system should consider this requirement (related train and path belonging to different timetable periods).

In XSD, it looks as follows:

```xml
<xs:element name="TimetableYear">
```
Refers to the timetable period in which the business will be carried out. 

```xml
<xs:annotation>
  <xs:documentation>Refers to the timetable period in which the business will be carried out</xs:documentation>
</xs:annotation>
<xs:simpleType>
  <xs:restriction base="xs:integer">
    <xs:minInclusive value="2012"/>
    <xs:maxInclusive value="2097"/>
  </xs:restriction>
</xs:simpleType>
```
8.2.4.7 Start-Date:

The start_date is the day of planned departure from the origin station of the object. The field is only present in the daily object. In XSD it looks as follows:

```xml
<xs:element name="StartDate">
  <xs:annotation>
    <xs:documentation>Is only used in the operational phase and refers to the date where the single train will start the train journey</xs:documentation>
  </xs:annotation>
  <xs:simpleType>
    <xs:restriction base="xs:date">
      <xs:minInclusive value="2012_01_01"/>
      <xs:maxInclusive value="2097_12_31"/>
    </xs:restriction>
  </xs:simpleType>
</xs:element>
</xs:sequence>
</xs:complexType>
```

8.2.4.8 Uniqueness of the code

It is the responsibility of the company that creates the code to ensure its uniqueness. For the lifecycle of an ID only the entity which has created it, is allowed to change it. Because a code is prefixed with the type and company codes a company only needs to ensure the “core element” is unique in each timetable period. If there is any change to the object in the timetable period and there is a need to hold two or more records — this is allowed providing each one uses a different variant (NOTE: if the UIC Leaflet 419_1/2 is used for generating the Core element, the variant field should be filled with ‘00’). Since the migration to the new identifiers is already started within the sector, the sector community of Railway Undertakings under the umbrella of FTE is currently investigating the methods related to the Core element of the TrainID and the future of the “legacy” identifiers such as UIC 419_1/2 in the TAF messages. Indeed, during the planning phase several train/path/other objects will be created. They may differ slightly in their information (e.g. a train running Monday to Friday has a different timetable than the same train on Saturday). To relate those similar objects easily, the variant can be used. Each object has the same core (~ family) and the other fields for the identifier but they differ in the variant (~ individual). More details about the usage of the Variant can be found in the Annex 8.2.
8.2.5 Relationship to existing identifiers

Operational Train Number (OTN)

All railway operations today identify trains using OTN (except for railways in Great Britain that uses 4 character alphanumeric). This OTN consists of up to eight characters (example: 5 digits in UIC Leaflets 419_1&2) which identifies the train. In addition, in most countries it is also used to describe the category of the train. This can include information such as a train’s speed, priority, route, direction, running order, timetable and some special needs (such as exceptional loads or hazardous goods).

- The rules for the uses of the number are complex and each country has different information included in the makeup of the train number.
- In all countries the train number is used by the signaling system to route and track the train across the rail network.
- The existing operational train number (OTN) must be retained as a reference to existing systems. It would no longer serve as the actual “identifier” of the train (as this creates the problems to be solved) but would be used as a way of identifying the train as part of the existing operational procedures.
- In addition, it was agreed that each IM (in conjunction with its national authorities) should be free to determine the rules for how it is used in accordance with its operational and safety standards.
- The numbering scheme described in UIC leaflet 419_1&2 regarding a decision of the RUs could continue to be used as the basis for the train numbering of international trains.

In the operational environment the operational train number (OTN) can be changed if national rules allow or require it. IMPORTANT: This is subject to the new rule that the IM must update the OTN in the Path object and inform all other affected IMs and RUs involved in the train run. In all these cases they would be required to do so electronically and include in the message the Train ID and the Path ID.

8.2.6 Communication with Identifiers

Both RU and IM must be able to receive and act on both types of identifiers. When exchanging messages and using the identifiers a RU or IM must be able to receive and process the message on occurrence. Consequently, Train ID and Path ID and the corresponding objects they identify must be recorded in systems of both RU and IM as well as the links between the objects. The responsible entity changing an ID shall inform all actors concerned about such a change, which results in an update of links between the corresponding objects. The entity which has received an update of a link notification shall introduce this update in its own systems. Changes of the Path ID and/or OTN without update of the links between the corresponding objects Path and Train can be described as irregular link destruction (i.e. inconsistent state in the databases of the partners/actors), a situation which leads into losing the possibility of tracking the train with all negative consequences.

Note: The details about the framework for updating the links between the objects can be found in the document “Update Link Framework” (#reference to be added) which is attached to the Sector Handbook.
8.2.7 Benefits of the Proposed Solution

8.2.7.1 Benefits to the Industry

The working group had to consider a large number of problems and constrains to be resolved in the identification of train. The benefits of resolving the problem of not being able to identify trains uniquely are widespread and not limited to those described here.

8.2.7.2 Full Life cycle

The first ID is created at the earliest possible time in the creation of a train by an RU and retained throughout its existence. This allows it to be used throughout all the steps of the business process of railway operation.

8.2.7.3 Reduction in the cost of resolving errors

By having clear identifiers, it will simplify the process of resolving incorrect data. All companies will have to check the data before it is exchanged with another company. Data can be checked as messages are received. All identifiers will contain their creators ID so may be traced back to who created them. By having the 2 IDs (Train ID and Path ID) and the operational Train number (OTN) it will be possible to cross check one ID against the other so simplifying the checking process.

8.2.7.4 Flexibility by separation of IDs

In the past the ID of trains has had to be used for many different purposes. Each one has constrained its use for the other purpose. By splitting the IDs for Train and Path while retaining the operational train number (OTN) will allow each one to be used for the respective purpose and set for that purpose. E.g. the Train ID may be set by the (lead) RU as a commercial reference that would be understood by its customers. In addition, this will help to reduce the cost of implementation, as it will be possible to include the IDs from legacy systems in the core element of the IDs.

8.2.7.5 Customer

An end customer in the future can follow its product throughout the entire lifecycle. It gives more reliability of information for the customer and allows tracking and traceability (ETA/ETI).

8.2.8 Summary

- The solution will give a separate identity to the Train and the Path. Both these IDs will be new and different from the existing train number.
During the transitional phase until new identifiers are implemented, the legacy identifier (such as operational train number OTN) is used as train identifier. After implementation, the legacy identifier will continue to be used for compatibility with signaling and other systems.

A standard ID structure is created which might be used for all objects for which data is exchanged between companies in TAF and TAP messages within RU/IM communication (TAP messages are also related to the commercial area that is not influenced at the moment by this IDs structure). Therefore, the information about other objects may be exchanged between IM and RU when they agree to do so. They could use the standardized generic ID structure too.

8.3 How to reach the aim (migration procedure)

In order to reach the aim of using the new identifiers in the industry, the following has to be taken into account.

- The use of messages between the partners depends on implementation status.
- The use of optional messages depends on local needs and rules.
- Use of optional elements depends on local needs and rules.
- The use of identifiers depends on implementation status of each partner

There are some basic rules to be considered:

It is up to every company itself to investigate and be responsible for its own internal migration. Due to different implementation steps of each of the involved partners and due to the different local use of optional messages and elements, each pair of partners needs to agree on the details of RU/IM message exchange prior to sending.

During the migration, the companies that use legacy identifiers have to agree with those that use the new identifiers about the content of the messages. Consequently, the companies that use new identifiers will additionally have to transfer the legacy identifiers to those companies that have still not adopted the new approach.

The proposed migration plan looks roughly as follows:
• Basically, in the first step of the implementation of TAF/TAP, the legacy identifiers such as OTN have to be used. During the implementation, there will be the need for testing the correctness of the new identifiers and methodologies of their use.

• Therefore, in the second step, the identification will still be made with “old” legacy identifiers such as OTN, but those companies that are implementing new identifiers and are mature to use them additionally in the messages can send the new identifiers, as an additional information regarding the objects.

• In the third step, the new identifiers will be used as the primary IDs, and the legacy IDs should be sent as an information. There is a mandatory requirement for all partners in the industry: there has to be backwards compatibility guaranteed between the steps two and three, since the various actors will have different speed in the implementing of TAF/TAP especially regarding the new identifiers. Therefore, the partners that are already using the new identifiers for the primary identification, have to be able to decode and exchange the messages by using “old” legacy identifiers with those partners that are still not mature with the new identifiers.

• In the fourth step, the new identifiers will be exchanged between all the partners as primary identifiers. As the end stage of the implementation, as the approval of the benefit of implementing the new identifiers concept, it should be possible that the links (relations) between the objects Train and Path can easily be changed (shifting of one Train its Path to another Path, swapping of 2 Trains and 2 Paths etc.) by every actor.

• This is a subject of change, according to the situation in the industry.

• In the migration phase, as it is already endorsed by the sector (WG10 TrainID Handbook, 3.6.5 Migration) the existing UIC leaflet 419_1/2 should be used for the generating of the Core element of the TrainID:
  o Some freight RU’s which members of FTE are decided in the General Assembly 2010 to use for the migration phase the train number according to
leaflet 419_2 as a rule for the core element of the train identification for international freight trains both in planning and operational phase.

- After the finalization of the migration to the new identifiers, the new identifiers have to be mandatory in the message exchange.

References for further reading (mandatory for implementation of the new identifiers!)

The following documents are necessary to be used:
- TrainID – OTN Framework (Annex 8.1)
- TrainID – Variant Framework (Annex 8.2)
- TrainID – Update Link Framework (Annex 8.3)
- TrainID – Case Reference Framework (Annex 8.4)
- TrainID – Object Info Framework (Annex 8.5)
- TrainID – UML Model (Annex 8.8)

With these documents, the details about the procedures of handling of the new identifiers and their relationship with legacy identifiers (such as OTN) is provided. UML model is given as the “Sparx Enterprise Architect” model as well as the full HTML website capable material (Annex 8.8).

WG10 Handbook was the baseline from 2011 endorsed by TAF TSI RU/IM Cluster. The content and ideas of WG10 Handbook have been taken over into the main text of this Sector Handbook as well as in the detailed annexes listed above.
9. Reference Data

9.1 Reference File Sector Handbook

This chapter describes the Sector Handbook for TAF and TAP TSI Reference Files for Countries, Companies and Locations and Subsidiary Locations.

The Reference files comprise:
- Countries
- Companies
- Locations
  - Primary
  - Subsidiary

The legal requirements for the reference files are derived from TAF 4.2.1.2 and TAP 4.2.19.1.

TAP TSI only
This section hereunder is relevant for TAP TSI only and has no impact on TAF.

For the operation of passenger trains on the European network, the following reference files must be available and accessible to all service providers (infrastructure managers, railway undertakings, authorised third parties and station managers). The data must represent the actual status at all times.

- reference file of the coding for all infrastructure managers, railway undertakings, station managers, service provider companies, terminals
- reference file of the coding of locations,
- […]

TAF TSI only
This section hereunder is relevant for TAF TSI only and has no impact on TAP.

For the operation of freight trains on the European network the following reference files must be available and accessible to all service providers (IMs, RUs, logistic providers and fleet managers). The data must represent the actual status at all times.

9.2 Document Objectives

This Implementation Guideline describes how to deal with various reference files that are shared between TAP and TAP TSI and could be used for legacy systems and additional purposes (e.g. RINF...)
- Definition of the reference files and content
- Initial load of the reference file data base (National location allocation entity
- The options for processes to maintain the reference files
- Regular maintenance of the reference files (responsible entities, companies)
- Update local copy of the Reference files on the local Common Interface

Other reference files, e.g. for Retail, and the use of location reference data for TAP Retail are not in scope of this document.
In particular, the Sector Handbook for TAF and TAP TSI Reference Files is an essential document to ensure that usage of Location descriptions within the TAF and TAP TSI framework is well defined and processes for regular operation are available to populate and maintain the data. Governance arrangements for the regular operation are proposed.

This document describes the Sector Handbook and the governance arrangements for the development and implementation. Finally, the document includes some technical appendices which describe the data being held.

The Sector Handbook contains all the necessary content to meet these objectives.

It is in the scope of the document to describe:
- the content of the Reference files,
- possible actors,
- possible Maintenance scenarios of Reference files,
- the access policy for use of the Reference files within the TAF and TAP framework.

It is out of scope of the document to describe:
- a detailed timetable for Implementation,
- national processes,
- company Hardware or Software solutions.

Normalised codes are needed to support data exchange as defined in the Technical Specification for Interoperability (TSI) relating to the subsystem Telematic Applications for Freight of the Trans-European Conventional Rail System and Telematic Applications for Passenger referred to in Council Directive 2008/57/EC. To ensure data quality, the TSI for Telematic Applications for Freight and for Passenger (TAF and TAP) defines the need for centrally stored and administered reference files to be a repository for these codes. These codes and reference files ensure consistency of data interpretation across various application systems.

### 9.3 Location reference file

The figure below shows the process to maintain Location reference files (process is identical for primary and subsidiary codes, but actors and actors’ rights can differ)
The TAF and TAP TSI Location Reference Data base is also known as the Central Reference File Database (CRD).

The figure below shows the different possibilities to maintain the location reference files.

How to feed the Reference files

- **Maintenance of Location Reference Files by National Entities (or registered companies for defined subsidiary type codes)**

1) **CSV file**
   - Manual import via central Administrator

2) **WEB GUI (Browser)**
   - https

3) **Legacy Location database (messaging)**
   - LocationFileDatasetMessage (xml)
To get access to the reference files there will be different possibilities:

- For people, the reference files will be accessible via a web browser to view them, edit and upload them, if necessary, rights defined for the user. For companies having a company code the usage of the web browser should be free of charge.
- For applications, there will be a web service provided by the Central Repository (CRD)
- For use within an IM or RU with local Common Interface, there will be a scheduled replication service from the CRD to a local Common Interface. The scheduler could be configured on the local Common Interface
- Use of a web service provided by a local Common Interface accessible for a company application

9.4 Regular Maintenance

Within each EU country a" National Allocation Entity" (which can be an Infrastructure Manager) will be responsible for ensuring that the TSI Location Reference files are maintained. In appendix III of the Regulation “Tasks to be undertaken by the TAF/TAP National Contact Point (NCP)” it is stated in in Article 6 “Work with the Member State to
ensure that an entity is appointed to be responsible for populating the Central Reference Files Database with primary location codes. The identity of the appointed entity shall be reported to DG MOVE for appropriate distribution.”

The Process to update the location reference files is provided as figure in Chapter 9.3. Company Codes will be allocated and administered by a central administration service (CAS) in cooperation with OSJD. Currently the registration Entity is UIC (RICS) which is already maintaining the 4-digit RICS code. The RICS code will be transferred to the TAP and TAF TSI reference files for Companies. Each participant of TAP and TAF TSI message communication and Locations files maintenance needs to have a company code. Company Codes can be requested at the time on UIC WEB Page: [http://www.uic.org/spip.php?article311](http://www.uic.org/spip.php?article311).

Country codes are maintained by the International Organization for Standardisation (ISO). Should a new country code be required or amended the requester should follow the process as laid out by ISO and documented on their website. [www.iso.org/iso/country_codes.htm](http://www.iso.org/iso/country_codes.htm)

**9.4.1 Roles in Regular Operation**

TAF and TAP TSI have defined an agreed set of actors. This section lists which actor type is particularly responsible for which type of activities:

<table>
<thead>
<tr>
<th>Actor Type</th>
<th>Responsibility of activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator of the CRD</td>
<td>Maintains the centralized Reference file system. Establishes and maintains new users and the technical interface for the maintenance of reference files based on the agreed governance</td>
</tr>
<tr>
<td>International Reference File Entity</td>
<td>Maintains common European location definitions (e.g. types of subsidiary locations, Border – Definitions) independent of a country or company. Defines, which Subsidiary Location Type can be attributed (maintained) directly by actors if National Allocation Entity allows this for its country.</td>
</tr>
<tr>
<td>National Allocation Entity</td>
<td>Is responsible for maintaining the uniqueness of locations coding within a country. The National Allocation Entity has to be agreed at a national level. It is specified in the Company Code List, who is the National Allocation Entity. (In many countries the largest IM has taken on this role.) The National Allocation entity decides if Subsidiary Location Types can be maintained directly (CRUD) by Allocation Companies (RUs, SMs).</td>
</tr>
<tr>
<td>Infrastructure Managers</td>
<td>Are accountable for ensuring that their locations are correctly coded in the CRD. (This may mean that an IM takes direct responsibility for the maintenance of locations within their network if a National Location</td>
</tr>
<tr>
<td>Role/Entity</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>File Entity</td>
<td>is not defined or if a country has one IM only.)</td>
</tr>
<tr>
<td>Railway Undertakings</td>
<td>Are accountable for ensuring that their subsidiary locations are correctly coded in the CRD. They may, if allowed by national governance, take direct responsibility for the maintenance of subsidiary locations for defined subsidiary type codes.</td>
</tr>
<tr>
<td>Station Managers</td>
<td>Are accountable for ensuring that their subsidiary locations are correctly coded in the CRD. They may, if allowed by national governance, take direct responsibility for the maintenance of subsidiary locations for defined subsidiary type codes.</td>
</tr>
<tr>
<td>Allocation Company</td>
<td>A actor defined on national level authorized to attribute Subsidiary Location Codes for specified subsidiary type codes. The National AllocationEntity will define the rights of an Allocation Company</td>
</tr>
<tr>
<td>Others</td>
<td>May request the creation of primary locations by National Entity or responsible IM</td>
</tr>
<tr>
<td>Guests</td>
<td>May be permitted read-only access to reference files. This category of actor includes all service providers IMs, RUs, SMs, logistic providers and fleet managers</td>
</tr>
<tr>
<td>National Contact Point (NCP)</td>
<td>Work with the Member State to ensure that an entity is appointed to be responsible for populating the Central Reference Files Database with primary location codes. The identity of the appointed entity shall be reported to DG MOVE for appropriate distribution.&quot;</td>
</tr>
</tbody>
</table>

**9.5 Project Actors for Reference Data**

The actors will be classified as one of:

- Administrators
- International Reference File Entity
- National Reference File Entity
- Infrastructure Managers
- Railway Undertakings
- Station Managers
• Others
• Guests

Following the governance individual named actors could be assigned for special tasks and executive power to take decisions, e.g. EU Commission, ERA, TAF and TAP Steering Boards, Provider of common elements [is procured by the Governance Entity].
9.6 Quality Criteria indicators

This section explains the Quality criteria for the Reference Files, in particular

- the delivery of Reference Files by responsible actors according to deadlines and
- their successful validation.

The completeness and uniqueness of primary locations are validated by IM in consideration of all locations which could be used in Messages between IM and RU. Missing locations will be added by the responsible National Allocation Entity.

A company using a primary code in messages has to make sure that this code is available in the Reference File or that the partner receiving the code has knowledge about its meaning.

The National Allocation Entity is responsible to ensure that a location is unambiguously coded (avoid doubling/ different primary codes for the same physical location).

The completeness of Subsidiary Location is to be secured by the IM responsible for mandatory Subsidiary Location types (as defined commonly).

Additional Subsidiary Location will be regulated by the railway sector based on the business needs. Therefore, the completeness will be secured by the railway sector itself. An actor using a subsidiary location code has to make sure that this subsidiary location code is available in the reference file or that the partner receiving the code has knowledge about its meaning.

Uniqueness of Subsidiary Location coding code will be secured by the respective National Allocation Entities or the Allocation Company if available.

In case an Allocation Company ceases to exist, rules have to be in place for how long the Subsidiary Code remains in the Reference Files or is handed over to a following company [manual process]. A company code cannot be deleted until all Subsidiary Codes using this code are deleted or handed over.

9.7 Data to be held

9.7.1 Company Description

The present document describes a coding structure to identify unambiguously and uniquely:

- Railway companies as defined in the Technical Specification for Interoperability _ Telematics Applications Freight Services (TAF_TSI) and TAP derived from the Directives 2012/34/EC and 2008/57/EC
- Other transport bodies
- Any other company involved in the rail transport chain.
The defined coding structure of CompanyIdent meets the requirements and vision of the TAF and TAP_TSI\textsuperscript{10}. It can be used in various applications and for different purposes (documents, messages, marking, etc.). The coding structure has sufficient flexibility to satisfy the expected demand for codes requested in the forthcoming decades in the current EU single market, its possible expansion and operation with non-EU member States.

The definition of Company comprehends the following as defined in the TAF and TAP_TSI:

- IMPartner
- NextResponsibleIM
- NextResponsibleRU
- Recipient
- ResponsibleIM
- ResponsibleRU
- PreviousResponsibleRU
- RUPartner
- StationManager
- Sender.
- Receiver

Further on only CompanyIdent is used\textsuperscript{11}.

<table>
<thead>
<tr>
<th>Company Code</th>
<th>N1</th>
<th>N2</th>
<th>N3</th>
<th>N4</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001 - 9999</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

Code Example 3 3 4 5

More details are to be found in Annex 9.1 of this Sector Handbook.

The code is unique within Europe

Currently the code uses numeric only, but for future use the code should be implemented in company applications as alphanumeric to be flexible enough if more than 9999 is needed.

9.7.2 Country description
This element indicates the type of a field containing the coded identification for a State/Country as defined by ISO 3166 – 2 position alpha code (2A).

\textsuperscript{10} ERA Technical Documents for TAF TSI _ ANNEX D.2 : APPENDIX C _ REFERENCE FILES and TAP_TSI B.8
\textsuperscript{11} TAF described a PartnerIdent which is similar to CompanyIdent and consequently is no longer used independent.
9.7.3 Location Description

Location is a place, a geographic point, inside or outside the rail network, which is needed to be identified for operational, technical, administrative or statistical purposes.

This can be either a Railway or location of RU Customer location. Locations can be logical or physical place, for example: Stations, Yards, Halts, Terminals or Loading Points, Warehouses, Maintenance Workshops, Transit Points, Handover points and Interchange points, Customer Sidings, Travel Agencies, Sales Points, Tracks X and so on. It can also represent a part or section of them.

Trains can start, end, stop, change line and time needs to be provided.

Definition of Primary Location
Primary location is a place used by IM to define a path for a train in TAF/TAP TSI framework/messages. This location is a rail point inside the rail network where train starts, ends, stops or runs through or change line. This location must be managed by an Infrastructure Manager (IM) identified by company code.
Primary locations are for example: Stations, Yards, Halts, handover points, border points, open access terminals.
Primary locations are identified by single and unique primary location codes. Primary location code is allocated based on processes defined by national entity. Primary location codes are used in any kind of TAF/TAP communication.

Here are only the main elements are shown. More details are to be found in Annex 9.1
• The first two characters (2 Alpha) contain the ISO 3166 Country Code defining the country where the location is (e.g. DE = Germany)
• The next five digit (1N - 5N) contain a non-significant LocationPrimaryCode to identify the location. Leading zero is not used. The LocationPrimaryCode has to be unique per country and each physical location shall have only one LocationPrimaryCode.

Country Code and LocationPrimaryCode are used in messages to identify a (primary) location. Within the Central Reference File, the key of Primary Location code consists of the Country code, the location primary code and the Start Validity Date as well. A primary code can be therefore more than one time in the CRD, but not with overlapping validity date.

**Definition of Subsidiary Location**

Subsidiary location must be linked to Primary location and specifies in more detailed way part, attributes or usage of Primary location. It may be also a non-rail point or a rail point that is not managed by an Infrastructure Manager (IM). It may be defined by entity having company code according to their needs. The Subsidiary location is optional and dependent upon business needs.

There are Subsidiary locations that are important for RU/IM communication as specifying part of Primary location e.g. from timetable construction point of view (like Track, Platform, Signal, etc.). These Subsidiary locations to be coded by responsible IM in order to ensure clarity. Additional Subsidiary locations are for example: Loading Points, Switches, Buildings, Border Point Codes, etc.

The Subsidiary location is identified by a subsidiary location code. Subsidiary location and subsidiary location codes can be used in data communication among involved parties based on company agreement or Network Statement. Each Subsidiary location is attributed to allocating company based on company code. It has to be used always in addition to the primary location code of the Primary location, in which the Subsidiary location is situated or which it refers to.
Here are only the main elements are shown. More details are to be found in Annex 9.1 Subsidiary location is always associated with a Primary location and is always comprised of a LocationSubsidiaryTypeCode, LocationSubsidiaryCode and AllocationCompany. All these elements make the subsidiary location code unique.

Country Code, LocationPrimaryCode, SubsidiaryTypeCode, LocationSubsidiaryCode and AllocationCompany are used in messages to identify a subsidiary location. Within the Central Reference File, the key consists of the Validity Start Date as part of the key.

- The two characters (2AN) comprise a pre-defined code, LocationSubsidiaryType Code. Code ‘00’ is undefined.
- The predefined codes are maintained by RNE. More details can be found in Annex 9.4.
- The next one to ten characters (1AN - 10AN) comprises a non-significant LocationSubsidiaryCode to identify a “dependent” location defined together with the LocationPrimaryCode.
- The Allocation Company in the Subsidiary Location is a part of the primary key of the location subsidiary code.
- The validity of the Subsidiary Location is bound to the life span of the Primary Location. There can be no Subsidiary Location without a valid Primary Location.

General rules for establishing Subsidiary location type. At least one of the following must be covered.

1. The Subsidiary location type defines a physical part (signal, track, platform, siding, etc.) of the Primary location which is important for the exchange of information related to the path.
2. Subsidiary location type defines an attribute or logical point related to a Primary
location which is important for communication between the partners IM, RU and their partners related to their business needs.

3. Subsidiary location types are not to be used to describe the technical details of a Primary location beside the above mentioned

4. New type codes should be fitting to the above described rules and must follow the TAF/TAP CCM process.

**Subsidiary type codes**

Locations are defined by a primary location code and optionally by a subsidiary location.

Primary locations are used for Stations and part of stations. Primary locations are used always for the level of stations of part of Stations. They will be maintained usually by the Infrastructure Manager or a National Allocation Entity.

Subsidiary locations are mainly used between the Railway Undertakings where detailed information within a primary location is needed.

For specific reasons as specified in certain messages for the communication between IM and RU the primary location needs to be further detailed, e.g. to indicate a specific track in the station. Therefore, subsidiary locations can also be used in messages between RU and IM.

A subsidiary location depends always on a primary location. Subsidiary locations are grouped by subsidiary types. The types are part of the key. Each Subsidiary location is allocated by an Allocation Company. Bases on national rules Freight and Passenger Companies are allowed or not to maintain subsidiary locations for certain subsidiary types directly in the central Reference file system.

An initial coding is based on the CEN workshop and TAF / TAP Expert Groups to support the messages within the TAF and TAP TSI framework.

The code for Subsidiary locations for some Subsidiary type code should be maintained mandatory by Infrastructure Manager, e.g. Relations between Stations (99) or by UIC, e.g. Boarder Points (03).

The coding was established under the premise to support the coding of subsidiary Locations

- in TAF and TAP TSI messages
- in the related business (applications)
• other useful locations e.g. for network statement

the coding is available in the CRD.

Which entity for which subsidiary location type can allocate subsidiary location codes is visible on the CRD at the subsidiary location types. The Matrix is initial maintained and may be adapted based on defined business cases.

If in general entities can maintain subsidiary locations directly into the CRD depend on the Flag “Allow Subsidiary Location Change:” which is maintained on Country Level. If there is no other indication by the responsible National Location entity in a country, the flag is enabled.

After the initial proposal further or adapted Coding will be established by related Coding Group and may be maintained as separated code schema.

Description of the whole location data set (xml)
The data set is described in Annex 9.1 and the description of the update message in xml is described in the message data catalogue (Annex 1)

9.7.4 Initially population

Use case
1. Initial loading of locations by Central CRD Admin
   The National Location Entity delivers a CSV file to the CRD Administrator. At the time RailNetEurope (RNE) is acting as CRD Administrator. The structure for CSV is available at the System manager RNE

9.7.5 Maintenance Use case
   (CRUD: Create, Read, Update, Delete)

2. Bulk import during operation by Central CRD Admin

   a. Companies
   b. Countries

4. CRUD by National Allocation Entity Locations for all locations (independent of CountryCodeISO and Company code)
   a. LocationPrimaryCode
   b. LocationSubsidiaryCode
   c. LocationSubsidiaryTypeCode

5. CRUD by National Allocation Entity LocationSubsidiaryCode for defined LocationSubsidiaryTypeCode
   Constrain: Maintenance of LocationSubsidiaryCode for defined LocationSubsidiaryType Code (no restriction of Country, Company)
6. CRUD by **National Allocation Entity (NAE)** for all locations
   Constrains: Location ISO Code of LocationPrimaryCode has to be same as User (Company) of the NAE
   a. LocationPrimaryCode
   b. LocationSubsidiaryCode

7. CRUD by **IM** for all locations
   Constrains:
   Element “ResponsibleIM” (Company Code) in LocationFileDataset has to be same as User (company) of IM
   Element “AllocationCompany” in LocationSubsidiaryCode has to be same as User (company) of IM

8. CRUD by Registered RU, SM (User) for LocationSubsidiaryCode
   Constrains:
   only if allowed for this country (to be defined by configuration in country file)
   only for LocationSubsidiaryCode at which the subsidiary type code is flagged “maintenance allowed by RU”

9. CRUD by Registered others (User) for LocationSubsidiaryCode
   Constrains:
   only if allowed for this country (to be defined by configuration in country file)
   only for LocationSubsidiaryCode at which the subsidiary type code is flagged “maintenance allowed by others”

10. CRUD by Registered Central Entity “LocationSubsidiaryCode (User) for LocationSubsidiaryCode
    Constrains:
    only for LocationSubsidiaryCode at which the subsidiary type code is flagged

**9.7.6 Availability of locations in CRD**
General rule for the first availability of an location in CRD is defined below:
- Before definition of Temporary Capacity restriction (TCR) - X-36,
- before construction of Prearranged Path (PAP) - X-24,
- before PAP publication - X-12.
- before Network statement publication - X-11.
- before date for accepting of path requests - X-8,
- before first use of respective code in data Communication (e.g. New short term validity point because of infra work).

**9.7.7 General rules for updates of locations in CRD**
General rules for updates of Locations in CRD are defined below:

**Update with non-changed StartDate shall be used in following situations**
- In case of correction of wrong value,
- In case of Change of flags (passengers/freight) (they have its own StartDate and EndDate

**Termination of Location + Creation of new Location (both with same Location Code)**
• In case of change any element name, except PassangerFlag and FreightFlag.

**Deletion of Location**

• should be avoided (only exception is deletion of new location created by technical mistake)

If the Location is out of operation it is defined in combination of StartDate and End Date.
10. Code Lists

This chapter is just a reference to the Annexes where the codes used in the RU/IM message exchange are given. For the simplicity purpose, and easier maintenance of the code list documentation, only the direct export from the most accurate XSD (schema) will always be provided. Since it is agreed within the sector, that every code list and the code should be documented in the annotation of the XSD, it is easier to keep the code list documentation centralized.

Some of the code lists are agreed by the sector to be only kept in the annotation of the element for the flexibility reasons:

- Message Type
- Error Code

The code lists can be found in Annex 6.3 (full code list document) and Annex 10.2 containing the important annotations for Message Type and Error Code.
11. Message Header for RU/IM communication

This chapter describes the message header that is common to all TAF and TAP RU/IM Messages.
11.1 Explanation of Message Header Elements

The Sender, Recipient and Message type fields are used to route the message to the right recipient based on configuration on the sending CI.

This Header also MUST be used for shared metadata messages exchanged between two partners. (Shared Metadata describes messages which could be exchanged between two or more partners.) The format can be locally defined and shared between partners. This also allows using the Common Interface for enhanced xml message exchange outside of the TAF and TAP defined metadata.

<table>
<thead>
<tr>
<th>Element</th>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Reference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Message Type</td>
<td>4n</td>
<td>The message type defines the functional message by a number. The message types are defined in the annotation of the Message Type element.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>As an example, value 2006 is the Path Request Message, value 1000 is Consignment Order Message, and 8500 is the sector message Update Link. The Path Request related messages are starting with 2, Operations related messages with 3 and 4, the Wagon related messages with 5, Dataset messages with 6. The sector messages have the 5 as the second digit (e.g. 2500 Path Coordination Message, 8500 Update Link Message)</td>
</tr>
<tr>
<td>Message Type Version</td>
<td>string ..25</td>
<td>The message type version defines the version of the message. It will be the version of the schema. It is proposed to use for each Message a single schema.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This will identify the version of the schema. For common metadata, this will be version of the metadata used, i.e. ‘5.3’ for the current version the metadata.</td>
</tr>
<tr>
<td>Message Identifier</td>
<td>String ..25</td>
<td>The message Identifier is assigned by the CI to secure the transactions are uniquely identified between the CIs for reliable messaging. It has to be unique.</td>
</tr>
</tbody>
</table>
|                         |        | The Message ID is a sting of 36 bytes. For technical point of view the MessageIdentifier is a universally unique identifier (UUID) created using java.util.UUID class. It is 128-bit value. We
are using randomUUID() function of UUID class which generates UUID using a cryptographically strong pseudo random number generator.

As string it is represented as 36 bytes (128 = 16 bytes, each byte is represented by a two-byte hex code. That makes it 32 bytes and there are 4 – separators)

If Company is using its own CI it has to produce the Message ID accordingly.

<table>
<thead>
<tr>
<th>Element</th>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Datetime</td>
<td>datetime</td>
<td>The date and time will be given by the CI to report the last time when the message was sent by the sender. It will contain the local time of the message sender. The convention is on local time with UTC offset.</td>
</tr>
<tr>
<td>Message Routing ID</td>
<td>2n</td>
<td>Normally the routing (configuration) on the Common Interface (CI) for incoming messages to the right legacy Application will be done based on the message type. There could be a need to have an additional routing code to identify a particular application on the receiver’s end. (i.e. routing to a combined transport or wagonload system.) In this case the Routing ID (defined by the receiver and agreed by the sender) allows definition and configuration on the receiving CI. Routing ID is mutually agreed by trading partners.</td>
</tr>
<tr>
<td>Sender Reference</td>
<td>string 25</td>
<td>This optional element allows the sending application to transfer a reference ID taken from the legacy message (e.g. ftp file number if unique) to the receiving CI and possibly to the receiving application (if supported). It could be used to link a legacy message with a TAP / TAF TSI Message over the translation Layer of the Common interface.</td>
</tr>
<tr>
<td>Sender</td>
<td>Company code string 4</td>
<td>The Sender defines the sender of a Message by its company ID. It will be configurable through message processing on the sending CI if not contained in the legacy message.</td>
</tr>
<tr>
<td>CI_InstanceNumber</td>
<td>2n</td>
<td>In case that a company has more than one CI (which is possible) the instance number is present as an attribute to identify the correct instance within a company. It will be configurable on the sending CI as a constant and should</td>
</tr>
<tr>
<td>Element</td>
<td>Format</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Recipient</td>
<td>Company code string 4</td>
<td>The Recipient is the receiving Company defined by the Company ID. It could be defined by the sending application or done by the CI by configuration. Origin information must come from the sending application (either contained within the message or by message processing configuration)</td>
</tr>
<tr>
<td>CI_InstanceNumber</td>
<td>2n (Attribute of Recipient)</td>
<td>In case that a company has more than one CI (which is possible) the Instance number is present as an attribute to identify the correct instance within a company. It will be configurable on the sending CI as a constant and should contain a default of &quot;01&quot; For example, it would allow routing of operational messages to instance No 1 of Company A and timetable messages to instance No 2 of Company A.</td>
</tr>
</tbody>
</table>

Sender Recipient and Message type are used to route the message to the right recipient based on configuration on the sending CI.

11.2 Example XML message after processing by the Common Interface

```xml
<MessageHeader>
  <MessageReference>
    <MessageType>2002</MessageType>
    <MessageTypeVersion>5.1.8</MessageTypeVersion>
    <MessageIdentifier>1c05811f-0dfc-4554-b9e2-1d053353b2bd</MessageIdentifier>
    <MessageDateTime>2011-10-04T19:34:39.062+1:00</MessageDateTime>
  </MessageReference>
  <SenderReference>2102.txt</SenderReference>
    <Sender CI_InstanceNumber="01">0080</Sender>
    <Recipient CI_InstanceNumber="01">0016</Recipient>
</MessageHeader>
```

11.3 Further explanation on Message Identifiers

The message ID is created by the CI immediately as the messages arrives on the CI not knowing any message structure at this time. This is necessary to log the legacy message at earliest stage. At CI it is used in all logs and also included in the messages in the Header element. Even if it is provided from Legacy system it will be replaced from CI within the messages processing, even if there is no translation.
Example of logging of message ID:

```
CET|MID=7142ac39_91a7_4b6d_93f6_0ecb542413c5|STS=RCVD|CT=IP
Socket|CI=0080_0083_out_2002_IPS|ENC=UTF_8|SIZE=205|RM=20020
Obersinn
MKI     2011113202334_004905008020178
Kiefersfelden
008100000004217320111114035048008022596NOBS
11.4 Payload of the Messages

The following chapters 12 to 18 and 20 will describe the detailed message payloads for
- Short Term Path Request
- Operation of Trains
- Train Preparation
- Train Running Information and Forecast
- Service Disruption/Train Running Interrupted
- Change of Track/Platform
- Train Journey Modified
- Delay Cause
- Train Location.
Part B Planning of Trains
12. Path Request

In TAF TAP regulation, Short-Term Path Request (STPR) is covered. However, it is a general agreement within the Sector to use TAF TAP messages/framework for the Path Request process (including annual timetable).

For the ERA Application Guidelines

Introduction

This chapter aims to provide with the necessary planning specific information that is required for the implementation of the messages by the various actors impacted as a result of complying with the TAF/TAP regulations.

The TAF and TAP TSIs are focused on the planning process for short term planning as the annual train services have short term amendments made to them e.g. cancellation of the service for the day, change of route for a week. In addition to the diversity of processes there is also a need to identify a train service during the different phases of planning and into operation. The use of the TAF/TAP processes for Long Term Planning is a recommendation outside and in addition to both TSIs. It is therefore up to the involved parties to agree on using it.

Assumptions:

- The term “Short Term Path Request” process denotes a number of different processes that range from Path Request, Path Cancellation, Path Modification/Alteration, Path Not Available and Path Utilisation.
- The Network Statement defines on each network when the Short-Term Path Request period is applicable before the running of a train.
- The application of Short-Term Path Request is mandatory according to TAP and TAF. The application of the same messages for Annual Timetable/Long Term Planning is optional.
- It is assumed that all activities described within the processes that are carried out by each IM are done so in accordance with their Network Statement.

The purpose of implementing TAF/TAP TSIs is to ensure an efficient and concrete exchange of information between IMs, Allocation Bodies, RAs and other service providers. The exchange of information is done in relation to the processes during the planning stage.

This information exchange is essentially bilateral and takes place between the IM in charge of the Path Section and the RU that will operate over the Path Section. In the case of an Open Access Operator the RU will be dealing with several Infrastructure Managers.

The framework for the allocation processes are laid down in Directive 2012/34 EU and described in detail in National Network Statements of the Infrastructure Managers.

A list of the main content is shown in the following table. The content of these can be accessed in the referenced Annex.
### Outputs Produced

<table>
<thead>
<tr>
<th>Business processes</th>
<th>Reference to Regulation / Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PATH REQUESTs</strong></td>
<td>TAF 4.2.2 / TAP 4.2.17</td>
</tr>
<tr>
<td><strong>Path cancellation by RA “applicable to Cooperation and Open Access models</strong></td>
<td>TAF 4.2.2 / TAP 4.2.17</td>
</tr>
<tr>
<td><strong>Path alteration by IM</strong></td>
<td>TAF 4.2.2 / TAP 4.2.17</td>
</tr>
<tr>
<td><strong>Path modification by RA</strong></td>
<td>TAF 4.2.2 / TAP 4.2.17</td>
</tr>
</tbody>
</table>

### Messages

<table>
<thead>
<tr>
<th>Messages</th>
<th>Reference or New</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Path Request</strong></td>
<td>TAF ANNEX D.2: APPENDIX F / TAP B.30</td>
</tr>
<tr>
<td><strong>Path Details</strong></td>
<td>TAF ANNEX D.2: APPENDIX F / TAP B.30</td>
</tr>
<tr>
<td><strong>Path Confirmed</strong></td>
<td>TAF ANNEX D.2: APPENDIX F / TAP B.30</td>
</tr>
<tr>
<td><strong>Path Details Refused</strong></td>
<td>TAF ANNEX D.2: APPENDIX F / TAP B.30</td>
</tr>
<tr>
<td><strong>Path Cancelled</strong></td>
<td>TAF ANNEX D.2: APPENDIX F / TAP B.30</td>
</tr>
<tr>
<td><strong>Path Not Available</strong></td>
<td>TAF ANNEX D.2: APPENDIX F / TAP B.30</td>
</tr>
<tr>
<td><strong>Receipt Confirmation</strong></td>
<td>TAF ANNEX D.2: APPENDIX F / TAP B.30</td>
</tr>
</tbody>
</table>

### 12.1 Introduction

This complete chapter aims to provide the necessary planning specific information that is required for the implementation of the messages by the various actors impacted as a result of complying with the TAF/TAP regulations. Other information that is related to planning, e.g. Train Identification, Architecture, can be found in dedicated chapters of this overall Sector Handbook.

#### 12.1.1 Long-term Planning linked with Short-term Planning

The TAF and TAP TSIs were initially focused on just the planning process for short term planning. As happens across virtually all networks in Europe annual train services have short term amendments made to them e.g. cancellation of the service for the day, change of route for a week. It therefore makes sense to use the same standards for annual planning and short-term planning.

In addition to the diversity of processes there is also a fundamental need to identify a train service during the different phases of planning and into operation. A European Train Identifier whose main benefit is to have the same number across the various stages – that includes moving from long term planning into short term planning is used in the messages. Extending the TAF/TAP processes to include long term activities as well as short term the problem of train identification for planning can be overcome.
The use of the TAF/TAP processes for Long-term Planning is a recommendation outside/in addition to both TSIs. It is therefore up to the involved parties to agree on using it.

12.1.2 The need for Harmonisation

At present, there is no mandate as such for the regulations to include harmonisation activities between:

- RAs when setting up a path request
- IMs when planning the path details

However, the handover point from one IM to the next IM, where the legal responsibility is changing, is often on a line section where the trains do not stop. This means, the RA interchange point is either in one of the journey locations before or after the handover point. Interchange point could be also on the Handover point. In this case, RAs could have the need to collaborate on these sections (e.g. who is requesting till where, which rolling stock is used). On the IM side, the times at the handover point are often just run through times. In any case, the times at handover provided by both of the IMs shall be the same. Therefore, some collaboration between the two involved IMs is required.

In order to have a fully joined up ‘Short-term Path Request’ process it could be considered that the harmonisation phases between the respective parties (Applicant to RA, IM to IM) are included as relevant activities. These activities take place currently in planning and they are incorporated into the overall process. However, harmonisation is not included in the regulations. Therefore, it has been made optional with a strong recommendation that RAs/IMs adopt them within their working practices.

12.1.3 Support Mechanism for Harmonization

A support mechanism that has the capability to support and maintain the Short-Term Path Request process as well as the information (messages) that the process produces helps in tracking and coordinating the different steps of a path request. Having such support not only helps to provide evidence of the message transactions that take place between the actors but also to provide benefits such as auditability, traceability and data recovery (in the case where information can be lost by sending/receiving systems). Having the planning information stored commonly will also help with management reporting and the ability to measure how the process is being utilised by the different parties.

This common support mechanism is likely to be in the form an IT system or tool, that is common to the usage of TAF/TAP and that will work in conjunction with the Actor systems. The tool will have to be fully compliant and could be adopted especially for the traffic involving more than one network or being interoperable in any other kind. Interactions to this tool within the specific processes that make up Short Term Path Request process (e.g. Path Request, Path Alteration) is represented by the swim lanes

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12 However, Directive 2012/34 Article 40 requires IMs to cooperate which each other for the allocation of infrastructure capacity which refers to a harmonization process
“coordination” and “order tracking” within the process diagrams themselves, see Annex 12.1.

The technical analysis of such a tool has to be carried out by interested parties. This will involve working with different actors (RAs, IMs) in order to define the best way to interact.

The harmonization process also works when using a bilateral data exchange between two communicating parties\(^\text{13}\) without a need of adopting the common support mechanism. The communication will use the same TAP and TAF standards.

### 12.2 Assumptions

- The term “Short-Term Path Request” process denotes a number of different processes that range from Path Request, Path Cancellation, Path Modification/Alteration, Path Not Available and Path Utilisation Notification.
- The Network Statement defines on each network when the Short-Term Path Request period is applicable before the running of a train.
- As described Short Term Path Request processes, for Short-Term Planning, have been further extended to include Long-Term Planning processes for the Annual Timetable (working timetable). Where there is information in the Planning section that is applicable to both processes, only Short-Term Planning will be mentioned even though it could apply to Long-Term Planning as well. Where there is information that is only applicable to one process and not the other, it will be specifically mentioned which process it is applicable to.
- The application of Short-Term Path Request is mandatory according to TAP and TAF. The application of the same messages for Annual Timetable/Long Term Planning is optional.
- It is assumed that all activities described within the processes that are carried out by each IM are done so in accordance with their Network Statement.
- Even if based on the fulfillment of TAF/TAP regulation, there might be the possibility that ‘Short-term Path Request’ processes will not be applied, and companies will be able to follow their national practices and regulations. This will be in the case of exceptional transport such as the planning of nuclear or military trains. This will have to be decided by the authorities that determine the national practices and regulations.
- Activities of third parties (e.g. shunting), acting on behalf of an RA or IM, have to be dealt by the responsible RA or IM who mandate the third party to handle the task(s). There will be no requirement for these third parties to be TAF/TAP compliant, this responsibility lies within the mandating company.
- Where there is a change of an RU in the operation, the responsible RA may use the resources (rolling stock/staff) of another company (e.g. RU). Responsibility and path ownership stay at the RA with the path contract. This has no impact to the regulation.

\(^{13}\) The two communicating parties are sender and receiver of the messages. The bilateral exchange could involve all parties relevant for the harmonization. E.g. RU1 to IM1, IM2 to RU2 etc.
• TAF and TAP apply both to interoperable traffic and domestic traffic.
• In relation to this document the term IM refers to an IM or an Allocation Body (AB) that carries out the same function as an IM.
• The term Path Section is used to describe a specific network section where there is an interoperable journey, however it also refers to a journey that is within one network.
• If the IM is the owner of the transport (e.g. maintenance train) it will carry out the same role as an RA and all processes will then be applied as normal.

12.3 Explanation on the involvement of the RUs and IMs
The principle of TAP and TAF regulation are underpinned by the communication and collaborative relationship between an RA and the relevant IM. For interoperable business this usually involves more than one RA and/or IM involved during the different sections of the path request. However, for domestic business the relationship can be between one IM and one RA only as well.

The diagram demonstrates the different types of relationships that the processes will apply to.
12.4 Summary of the outputs

A list of the main content is shown in the following table. The content of these can be accessed in the Annex 12.

<table>
<thead>
<tr>
<th>Outputs Produced</th>
<th>Reference to Regulation / Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business processes</strong> (diagrams and descriptions)</td>
<td><strong>Specific Section</strong></td>
</tr>
<tr>
<td>PATH REQUESTs</td>
<td>TAF 4.2.2 / TAP 4.2.17</td>
</tr>
<tr>
<td>Cooperation model &quot;full harmonisation&quot;</td>
<td>Note that harmonization is not described in TAF</td>
</tr>
<tr>
<td>Cooperation model &quot;partial harmonisation&quot;</td>
<td></td>
</tr>
<tr>
<td>Open Access (single RU) &quot;full harmonisation by IMs&quot;</td>
<td></td>
</tr>
<tr>
<td>Open Access (single RU) &quot;partial harmonisation by IMs&quot;</td>
<td></td>
</tr>
<tr>
<td>Path requests via an OSS</td>
<td></td>
</tr>
<tr>
<td>Path cancellation by RA &quot;applicable to Cooperation and Open Access models&quot;</td>
<td>TAF 4.2.2 / TAP 4.2.17</td>
</tr>
<tr>
<td>Path alteration by IM</td>
<td>TAF 4.2.2 / TAP 4.2.17</td>
</tr>
<tr>
<td>Path Utilisation notification</td>
<td>Not enforced by the TSIs</td>
</tr>
<tr>
<td>Path modification by RA</td>
<td>TAF 4.2.2 / TAP 4.2.17</td>
</tr>
<tr>
<td>Annual timetable &quot;Long Term Planning&quot;</td>
<td>Not enforced by the TSIs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Messages</th>
<th>Reference or New</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path Request</td>
<td>TAF ANNEX D.2: APPENDIX F / TAP B.30</td>
</tr>
<tr>
<td>Path Details</td>
<td>TAF ANNEX D.2: APPENDIX F / TAP B.30</td>
</tr>
<tr>
<td>Path Confirmed</td>
<td>TAF ANNEX D.2: APPENDIX F / TAP B.30</td>
</tr>
<tr>
<td>Path Details Refused</td>
<td>TAF ANNEX D.2: APPENDIX F / TAP B.30</td>
</tr>
<tr>
<td>Path Cancelled</td>
<td>TAF ANNEX D.2: APPENDIX F / TAP B.30</td>
</tr>
<tr>
<td>Path Not Available</td>
<td>TAF ANNEX D.2: APPENDIX F / TAP B.30</td>
</tr>
<tr>
<td>Receipt Confirmation</td>
<td>TAF ANNEX D.2: APPENDIX F / TAP B.30</td>
</tr>
<tr>
<td>Path Coordination</td>
<td>Not enforced by the TSIs</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Path Section Notification</td>
<td>Not enforced by the TSIs: serves also as a replacement for Path Utilization Notification for simplicity reasons</td>
</tr>
<tr>
<td>Error</td>
<td>Adopted into Common Metadata XSD</td>
</tr>
<tr>
<td>Path Utilisation notification</td>
<td>Replaced by Path Section Notification message with the corresponding TypeOfInformation code</td>
</tr>
</tbody>
</table>

In addition to the messages and processes code lists have been developed to support the data exchange. See chapter 10.

12.5 Processes

12.5.1 High Level Overview of the Process

The purpose of implementing TAF/TAP TSIs is to ensure an efficient and concrete exchange of information between IMs, Allocation Bodies, RAs and other service providers. The exchange of information is done in relation to the processes during the planning stage.

This information exchange is essentially bilateral and takes place between the IM in charge of the Path Section and the RU that will operate over the Path Section. In the case of an Open Access Operator the RU will be dealing with several IMs.

The processes that make up the ‘Short-term Path Request’ and the “Long Term Path Request” are shown as a high-level process overview. The TAF/TAP messages that need to be produced are overlaid onto the process activities that take place.  

---

14 Rejected by Change Control Management
15 Rejected by Change Control Management
16 Approved by Change Control Management
17 Rejected by Change Control Management
18 (**) Note that elements marked with two stars are waiting approval by Change Control Management
Process short-term path request with declaration of pre-accepted offer – sequence of messages (harmonization phases are not included)

*Note: In principle, an ErrorMessage can also be sent by receiver to sender at any process steps as result of previous incorrect message.

In most cases the erroneous message has to be corrected and sent again. Exception: Error Message after a PathRequestMessage can end the process, too.

**Note: ReceiptConfirmationMessage is sent after a technical check that a message was received successfully, otherwise Error Message. It has to be done after receiving any kind of message.

***Note: In process type "request" it is allowed to change TraI’d in PathRequestMessage with MS = modification

Legend:
- PTID: PlannedTransportIdentifier
- RTPID: RelatedPlannedTransportIdentifier
- PRID: PathRequestID
- RA: Responsible Applicant
- IM: Responsible IM
- MS: Message Status
- TOI: TypeOfRequest
- TOC: TypeOfInformation

End of process short term path request with declaration of pre-accepted offer
Process short-term path request - sequence of messages (harmonization phases are not included)

Legend:
PTD: PlanTransportIdentifier
RPTID: RelatedPlanTransportIdentifier
PTID: PathRequestID
RA: Responsible Applicant
RS: Responsible SNS
MS: MessageStatus
TOR: TypeOfRequest
TOR: TypeOfInformation
—— Alternative action

Start
Path request
- PathRequestMessage (PTD, PRD, TransID, MS: Creation (1), TOR: Request (2), TOI: Request ready (1) or harmonization complete)

RA: Check PathRequestMessage
- Incorrect
- Correct
- Modification of request before path offer
- Receive confirmation
- Path elaboration
- Refusal without reason
- Acceptance of offer
- Implicit acceptance
- Implicit rejection
- Final path offer
- Refusal justified
- Refusal not justified
- No path offer possible
- Path contract
- Path contract does not exist

RA: Check Refusal
RA: PathDetailsMessage (PTD, PRD, TransID, PathID, MS: Creation (1), TOR: Request (2), TOI: Final offer (16))

First refusal offer
- PathDetailsMessage (PTD, PRD, TransID, PathID, MS: Creation (1), TOR: Request (2), TOI: Final offer (16))
- PathDetailsRefusedMessage (PTD, PRD, TransID, PathID, MS: Creation (1), TOR: Request (2), TOI: Offer rejected (without reason) (27))

Error correction and send message repeatedly

RA: Error correction or final step?
Final step of process

Rejection due to technical reasons
- Error Message (PTD, PRD, MS: Creation (1))
- PathRequestMessage (PTD, PRD, TransID, MS: Creation (1), TOR: Request (2), TOI: Withdrawn (29))

Withdrew

Rejection due to functional reasons
- Error Message (PTD, PRD, MS: Creation (1))
- PathRequestMessage (PTD, PRD, TransID, MS: Creation (1), TOR: Request (2), TOI: No alternative available (31))

No path elaboration possible

First refusal offer
- PathDetailsMessage (PTD, PRD, TransID, PathID, MS: Creation (1), TOR: Request (2), TOI: Final offer (16))
- PathDetailsMessage (PTD, PRD, TransID, PathID, MS: Creation (1), TOR: Request (2), TOI: No alternative available (21))

Refusal without reason
- Error Message (PTD, PRD, MS: Creation (1), TOR: Request (2), TOI: Offer rejected (without reason) (25))

Second refusal offer
- PathDetailsMessage (PTD, PRD, TransID, PathID, MS: Creation (1), TOR: Request (2), TOI: Final offer (16))
- PathDetailsMessage (PTD, PRD, TransID, PathID, MS: Creation (1), TOR: Request (2), TOI: Final offer (16))

*Note: In principle, an ErrorMessage can also be sent by receiver to sender at any process stage as a result of previous incorrect message. In most cases the erroneous message has to be corrected and sent again. Exception: ErrorMessage after a PathRequestMessage can end the process, too.

**Note: ReceiveConfirmationMessage is sent after a technical check that a message was received successfully, otherwise ErrorMessage. It has to be done after receiving any kind of message.

***Note: Internal process step by RA depending on network statement no message exchange with RA

****Note: In type process "request" it is allowed to change TransID in PathRequestMessage with MS = modification
*Note: In principle, an ErrorMessage can also be sent by receiver to sender at any process steps as result of previous incorrect message. In most cases the erroneous message has to be corrected and sent again. Exception: Error Message after a PathRequestMessage can end the process, too.*

**Note: ReceiptConfirmationMessage is send after a technical check that a message was received successful, otherwise Error Message. It has to be done after receiving any kind of message.**

***Note: Internal process step by RA: depending on network statement no message exchange with RA***

****Note: In process type "request" it is allowed to change TrainID in PathRequestMessage with MS = modification***

*****Note: Depending on specific network statement it is allowed to send modification/deletion of PathRequestMessage by RA after receiving draft offer in observation phase.*****
12.6 The need for Full and Partial Harmonization

Where a short-term path request for traffic (either passenger or freight) running across one or more networks is placed in sufficient time ahead of the operation, the IMs will be able to deliver **full harmonisation** for the path details for all of the sections that comprise the whole journey. Full harmonisation is when the complete journey for the traffic, covering all of the respective path sections, has been able to be fully validated by the IMs involved and all times are confirmed, especially those where the train changes from one IM to another.

Where a path request is placed at the short notice or if the complexity of the path request requires more time than anticipated (according to the deadlines set in national agreements or in their Network Statements), the IMs will not be able to coordinate all of the sections for the whole journey. In this case the Applicant(s) will receive path details from the IM which are just coordinated with the next neighbouring IM only ensuring that the train travel across that section. In addition, if the Applicants are not in a position to coordinate the request, (e.g. do not have resources for the request because of the short notice) the Lead RU\(^{19}\) or the RA at the beginning of the traffic may place a partially harmonised request. In this case the first IM/RA pair is able to start working on the request the following IM/RA pair(s) will follow as soon as the request is ready for the next path section. The request is handled more sequentially, and it is not necessary that all the latter sections have been confirmed before that train sets off across its journey. This is called **partial harmonisation**.

There are separate path request processes for the two types of harmonisation.

In some cases, a request for traffic starts off with the aim of carry out a fully harmonised process and it may be necessary, for whatever reason, to switch from full to partial harmonisation processes. By default, the aim of harmonisation is to achieve a full harmonisation of the journey (all path sections), as represented in the Message (Path Request or Path Details) by two separate elements “Type of RA Harmonisation” and “Type of IM Harmonization”.

If this is the case the Lead RA or Coordinating IM sets the Type of Harmonisation to Full. However, this is not possible in all cases and can subsequently be changed to Partial. For example if the Lead RA realises that it will not be possible to harmonise the path request with all other involved RUs in due time (e.g. RA at the end of the journey has not clarified the appropriate need for resources), the Lead RU shall have the possibility to change the element ‘*Type of RA Harmonisation*’ in the message Path Request from ‘full’ to ‘partial’.

On the other hand, it could happen that the IMs are not in a position to send harmonised path details to the RA (in case of an Open Access request) or to all involved RAs (cooperation model) in due time. This could be for example in a case where there is a shortage of time between placing the request involving several networks and the

\(^{19}\) See chapter 7 for the different uses of the term “Lead RU” in TAF and TAP. In the following text, “Lead RU” is used to designate this RU/AP for TAP.
foreseen departure time at the origin of the train. The Coordinating IM or as a default the IM at the first network of the train departure shall have the possibility to change the element ‘Type of IM Harmonisation’ in the message ‘Path Details from ‘full’ to ‘partial’.

12.7. Path Request Scenarios

Several path request scenarios will be possible between the RAs (s) and the IM(s) for interoperable passenger/freight traffic. A number of the most commonly scenarios are shown as follows:

Scenario A (Case A/B) adheres to the Open Access business model whereby there is only one RA, but several IMs involved throughout the journey. Scenario B (Case A/B) adheres to the Cooperation business model whereby more than one RA and IM are involved throughout the journey. These models are documented in the TAF Regulation 4.2.2.1

Note: These are not the only scenarios possible for interoperable traffic, in fact there can also be a combination of the above scenarios.

Also shown in the diagram is the need for coordination and harmonisation.

For some domestic traffic (applicable to the TAP regulation) where only one RA and IM will be involved therefore the scenario is very straightforward. Communication between the parties takes place at bilateral level which can be basically seen as a sub-scenario of scenario A case A.

The scenario A covers the process when the RA contacts all the IMs involved. This can also be carried out without harmonization (e.g. through a central tool or in bilateral data
exchange) between the different IMs. According to chapter 4.2.2.1 of TAF scenario A) defined in the following process, the AP contacts all involved IMs directly or via the OSS to organise the paths for the complete journey.

12.8 Short-Term Path Request process

The Short-Term Path Request process (TAP BP 4.2.17, TAF 4.2.2) is, in fact, made up of a number of different processes that cover the different activities that take place during the planning phase. Key to the activities is the actual placement in time and confirmation of the request itself. However, after a path is booked other activities continue to take place such as modifying the path, cancelling the path for a number of days and even activating a path (as is the case in several networks). The main processes are:

<table>
<thead>
<tr>
<th>Process</th>
<th>Relevant for TAP and TAF</th>
<th>Outside the TAF or TAP regulation, but developed from best practise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path Request</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Path modification by an</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Path cancellation by RA</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Path alteration by IM</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Path Utilisation notification</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Path Studies</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

In addition to the Short-Term planning processes an extended process for carrying out the activities in Long Term planning for trains in the Annual Timetable has been developed. Currently the use of this process and message exchange will be a recommendation outside of the legal requirements of TAF and TAP.

This section provides an overview to each of the processes that have been developed. Annex 12 describes the Short Term and Long-Term planning processes, in terms of descriptions and diagrams, in more detail.

12.8.1 Process “Short-Term Path Request”

This process is based on the steps and activities for Short Term planning.

The RA will place a request for the Path Section in the journey and the IM will offer the path back. The RA accepts the offer and the path will be booked by the IM. However, it could also occur that the Path Request cannot be answered by the IM (due to technical or logical errors in the request itself). It is also possible that the RA refuses the offer. These possibilities are all described in the process descriptions and documents.

Two separate processes have been produced, one for each of the business models

- Cooperation model (where several RAs are involved with several IMs)
- Open Access (where one RA is involved with several IMs)
In the situation where there is a possibility to have harmonization between the IMs the harmonisation should be done according to the process hereafter. In cases where this is not possible (e.g. due to a very short notice request), it is possible for the harmonization to be omitted.

12.8.2 Process “Short-Term Path Request – Full Harmonization”

This process is based on the steps and activities for Short-Term planning. All path sections must be harmonised and agreed between the involved RAs before requesting and all involved IMs before an offer can be made back to the RUs.

The RA will place a request for the Path Section in the journey and the IM will offer the path back. The RA accepts the offer and the path will be booked by the IM. However, it could also be the case that the Path Request cannot be answered by the IM (due to technical or logical errors in the request itself). It is also possible that the RA refuses the offer. These possibilities are all described in the process descriptions and documents.

Two separate processes have been produced, one for each of the business models
- Cooperation model (where several RAs are involved with several IMs)
- Open Access (where one RA is involved with several IMs)

12.8.3 Process «Short-Term Path Request partial harmonisation»

This process is based on the steps and activities for Short Term planning for Full Harmonisation.

It might be that all path requests may not be able to be harmonised between the Applicants and that the IMs will not be in a position to always deliver harmonised path details. This is mostly in the case of very short-term Path Requests where the time limit between the path request and the train departure is too short and it is not possible to harmonise the path request and/or path details. This process may be applied for the following business models:

Two separate processes have been produced, one for each of the business models
- Cooperation model (where several RAs are involved with several IMs)
- Open Access (where one RA is involved with several IMs)

12.8.4 Process «Path cancellation by RA »

This process applies to both paths in the Annual Timetable and those booked using the Short-term planning process.

Whether the path was booked in the long-term planning (annual timetable) or as a short request, the RA must have always the possibility to cancel a booked path. This path
cancellation may refer to one single day, several or all remaining days. It is also possible to cancel the whole traffic (all of the path sections) or just one or more partial sections of the traffic (one path section).

However, in case there are several path sections with RAs involved, it may even be possible that one of the involved RAs may keep its booked path section and reuse it for another train. By doing so, the path modification process shall be applied instead for the RA that still wishes to use the path section for other traffic. Partial cancellation is not recommended without harmonization with partner RAs and IMs in order not to destroy the path.

Process path cancellation – sequence of messages (harmonization phases are not included)

12.8.5 Process «Path alteration by IM»

This process applies to both paths in the Annual Timetable and those booked using the Short-term planning process.
Based on the path agreement, the RA can expect that a booked path is available up to its operation. However, if an event occurs (e.g. disruption to the path) prior to the start of the operation and the booked path from either the long-term (annual timetable) or short-term planning is no longer available, the IM must inform the RA as soon as it has the knowledge about this fact.

A cause of the event (e.g. an interruption on the path) needs to be indicated to the RA. This can happen at any time between the moment the path is booked and the departure of the train. The IM is obliged to send an alternative proposal together with the indication the Path is not available. However, this is not always possible. In that case the IM must inform RA immediately. Special cases like the interruption of the path in the middle of the route have to be handled separately. The general rule agreed in the sector is to avoid such situations of path interruption in the middle, if possible. If it cannot be avoided, the handling of such a case needs to be started immediately between the partners and the following possibilities need to be analysed:

- Providing an immediate alternative by the IM on which territory the interruption happened, all other paths (and/or path sections) remain booked as before
- No possibility to provide the alternative for the interrupted section: all other paths (and/or path sections) remain booked and used by RA (example of 3 IMs in 3 countries: the second IM has an interruption, but the RUs keep using the paths in IM1 and IM3 territories). In such a case, the “Train splitting” consequences for the RA (significant change on the train object) have to be considered.
- Cancelation of the whole path by the RA and request a new one – depending on the commercial conditions between IMs and RA
- Non-availability announced by IMs for the whole path and providing the coordinated alternative

This path alteration may refer to one single day, several days or all remaining days. It is also possible to alter the whole path section or just a part of it.

The simplified process model with messages looks as follows.

**Process path alteration or path cancellation by IM – sequence of messages**
TAP TSI and TAF TSI

RU/IM Sector Handbook

Submitted on: 04/06/2019

Legend:
- PTID: PlannedTransportIdentifier
- RPTID: RequeriedPlannedTransportIdentifier
- RRU: ResponsibleReceiver
- RRA: ResponsibleApplicant
- IM: InformationMessage
- MS: MessageStatus
- TOR: TypeOfRequest
- TCI: TypeOfConfirmation
- PathID (old): PathID of blocked path which has to be cancelled/canceled
- PathID (new): PathID of new path as result of alteration
- Action: Alternative action depending on network status

Acceptance of offer
- RA: PathConfirmedMessage
- PTID: PathID (new), RPTID: PathID (old)
- MS: Creation (1), TOR: Modification (3)
- TCI: Alternative offer accepted (16)

Path blocking
- RA: PathDetailsMessage
- PTID: PathID (new), RPTID: PathID (old)
- MS: Modification (2), TOR: Modification (3)
- TCI: Blocked (22)

IV: Does the complete previous path be modified on all days?
- Information about kept part of old path contract

IM: PathDetailsMessage
- PTID: PRO, RPTID: PathID (old)
- MS: Modification (2), TOR: Modification (3)
- TCI: Blocked (22)

IV: Check if the original path can be kept?
- Information about modified part of Path

IM: PathDetailsMessage****
- PTID: PRO, RPTID: PathID (old)
- MS: Modification (2), TOR: Modification (3)
- TCI: Blocked (22)

Old (previous) path contract remain unchanged

New path contract (may be)
- kept part of old (previous) path

End

IM: PathReservedMessage
- PTID: PathID (old), RPTID: PathID (old)
- MS: Creation (1), TOR: Modification (3)
- TCI: No alternative available (21)

IM: PathDetailsMessage****
- PTID: PRO, RPTID: PathID (old)
- MS: Modification (2), TOR: Modification (3)
- TCI: Blocked (22)

IM: PathDetailsMessage****
- PTID: PRO, RPTID: PathID (old)
- MS: Modification (2), TOR: Modification (3)
- TCI: No alternative available (21)

RA: PathConfirmedMessage
- PTID: PathID (new), RPTID: PathID (old)
- MS: Creation (1), TOR: Modification (3)
- TCI: Alternative offer accepted (16)

IM: PathDetailsMessage
- PTID: PathID (new), RPTID: PathID (old)
- MS: Creation (1), TOR: Modification (3)
- TCI: Alternative offer rejected (without revision) (29)

IM: PathDetailsMessage
- PTID: PathID (new), RPTID: PathID (old)
- MS: Creation (1), TOR: Modification (3)
- TCI: Alternative offer rejected (with revision) (28)

Refusal without revision
- RA: PathDetailsMessage
- PTID: PathID (new), RPTID: PathID (old)
- MS: Creation (1), TOR: Modification (3)
- TCI: Alternative offer rejected (without revision) (29)

Refusal without revision
- RA: PathDetailsMessage
- PTID: PathID (new), RPTID: PathID (old)
- MS: Creation (1), TOR: Modification (3)
- TCI: Alternative offer rejected (with revision) (28)

Repetition of alternative offer
- RA: PathDetailsMessage
- PTID: PathID (new), RPTID: PathID (old)
- MS: Creation (1), TOR: Modification (3)
- TCI: Alternative offer rejected (without revision) (29)

IM: Check if there is an alternative offer available
- RA: PathDetailsMessage
- PTID: PathID (new), RPTID: PathID (old)
- MS: Creation (1), TOR: Modification (3)
- TCI: Alternative offer rejected (without revision) (29)

No alternative path offer available

IM: Check if there is an alternative offer available
- RA: PathDetailsMessage
- PTID: PathID (new), RPTID: PathID (old)
- MS: Creation (1), TOR: Modification (3)
- TCI: Alternative offer rejected (without revision) (29)

No alternative path offer available

IM: does the complete previous path can be canceled on all days?
- RA: PathDetailsMessage
- PTID: PathID (new), RPTID: PathID (old)
- MS: Creation (1), TOR: Modification (3)
- TCI: Alternative offer rejected (without revision) (29)

IM: Check if there is an alternative offer available
- RA: PathDetailsMessage
- PTID: PathID (new), RPTID: PathID (old)
- MS: Creation (1), TOR: Modification (3)
- TCI: Alternative offer rejected (without revision) (29)

No alternative path offer available

End of process alteration
- Condition: Old (previous) path is fully, partially or not modified;
both IM and RU know which path or part of old (previous) path are valid or which path or part of path are canceled

*Note: In principle, an ErrorMessage can also be sent by receiver to sender at any process steps as result of previous incorrect message.
In most cases the erroneous message has been received and been sent again. Exception: Error Message after a PathRequestMessage can end the process, too.

**Note: ReceiptConfirmationMessage is sent after a technical check that a message was received successfully, otherwise ErrorMessage. It has to be done after receiving any kind of message.

***Note: In particular cases IM sends more than one PathDetailsMessage for the remaining parts of previous path if modification or cancellation splits previous path in more than one remaining parts (in time and/or local section).
Where the alternative is physically not possible, the Path Not Available message will carry the corresponding type of information (21) which should indicate that the alternative is not possible. In all other cases, the IM will send Path Not Available message with type of information 23 (preparation of alternative offer in progress) and then send the Path Details message containing the alternative offer.

12.8.6 Process «Path modification by RA »

This process applies to both paths in the Annual Timetable and those booked using the Short-term planning process.

Based on the path agreement, the RA intends to change some elements of the train that could impact the path details after it has been booked. A modification can be done for one day, several or all remaining booked days. Modifications that need to be communicated are described in the Network Statement and could be for example:

- Change of engine type with same performance
- Reduction in the train length/weight
- Operational stop changes to technical stop

If a Path Modification has a strong impact on the path, the IM can reject the modification. The RA needs to cancel the allocated path (fully or partially) and to place a new request. This will lead to a new path request where the IM will send first a draft offer after the path elaboration.

The simplified process model with messages looks as follows.
Process path modification – sequence of messages (harmonization phases are not included)

Start: Modification of looked path
- Path Request Message
  - PTI: PRI, PDI: same TransID, PND: (old)
  - MS: Creation (1), TOR: Modification (3)
  - TD: Request ready (4) or harmonization complete ...

Modification of request to other path offer
- Path Request Message
  - PTI: PRI, PDI: same TransID, PND: (old)
  - MS: Modification (2), TOR: Modification (3)
  - TD: Request ready (4)

Receipt confirmation
- Path Request Message
  - PTI: PRI, PDI: same TransID, PND: (old)
  - MS: Modification (3), TOR: Modification (3)
  - TD: Message accepted (6)

Path completion
- Path Request Message
  - PTI: PRI, PDI: same TransID, PND: (old)
  - MS: Modification (3), TOR: Modification (3)
  - TD: Withdraw (25)

Final offer
- Path Request Message
  - PTI: PRI, PDI: same TransID, PND: (old)
  - MS: Creation (1), TOR: Modification (3)
  - TD: Final offer (26)

Path blocking
- Path Request Message
  - PTI: PRI, PDI: same TransID, PND: (old)
  - MS: Creation (1), TOR: Modification (3)
  - TD: Final offer (26)

Path selection
- Path Request Message
  - PTI: PRI, PDI: same TransID, PND: (old)
  - MS: Creation (1), TOR: Modification (3)
  - TD: Final offer (26)

End of process modification
- Path Request Message
  - PTI: PRI, PDI: same TransID, PND: (old)
  - MS: Creation (1), TOR: Modification (3)
  - TD: Final offer (26)

New path contract (and/or keep part of old previous path)
- Path Request Message
  - PTI: PRI, PDI: same TransID, PND: (old)
  - MS: Modification (2), TOR: Modification (3)
  - TD: Final offer (26)

New path contract (old previous path contracts) remain unchanged
- Path Request Message
  - PTI: PRI, PDI: same TransID, PND: (old)
  - MS: Modification (2), TOR: Modification (3)
  - TD: Final offer (26)

*Note: In principle, an Error Message can also be sent by receiver to sender at any process stage as result of previous incorrect message. In most cases the erroneous message has to be corrected and sent again. Exception: Error Message after a Path Request Message can end the process, too.

**Note: Path Request Message is sent after a technical check that a message was received successful, otherwise Error Message.

***Note: Process step is required for internal processes by IM (no message exchange with RA).

****Note: In particular cases IM sends more than one Path Details Message for the remaining parts of previous path if modification sports previous path in more than one remaining parts (in time and/or local section)
Process path modification with declaration of pre-accepted offer – sequence of messages (harmonization phases are not included)

12.8.7 Process «Path Utilisation Notification by RA »
This process applies to both paths in the Annual Timetable and those booked using the Short-term planning process.

In some networks it is possible to pre-book a path and it is called an “on demand path”. The capacity has been allocated to an RA who has to inform the IM in due time and prior to the operation on the utilisation of this path, meaning that the train should then be run operationally. This type of practice between RA and IM is mainly used in cases where an RA has regular transport needs but does not know when to make the path request e.g. due to fluctuations in business. All of the path information (e.g. period, origin location, route etc..) is built up in the “on demand path” and is treated in exactly the same way by the IM whereby a path is offered and subsequently booked.
12.8.8 The Need for Path Studies
The intention of a path study is to support the RA by the IMs while setting up a path request in anticipation of placing the actual request. It allows the RA to get timings for its intended train service to be used in its planning before placing a path request. Path studies make a significant contribution to the efficiency of the path allocation process for the annual timetable. These studies allow applicants’ service plans to be checked for feasibility and, as necessary, taken through into the next stages of the planning process. It is used mainly in the working timetable but can also be applied for the running timetable. No separate process description has been considered for this. This is because the process is identical for a path request, except the last step of the booking the path will not be carried out by the IM.

The IM answer to a path study request before the timetable starts is never binding. If the path study had been placed within the running timetable, the legal status of an IM answer depends to company/national rules.
Path studies are in addition to TAF and TAP. It follows best practice from the sector and can be used with the TAP and TAF standards although it is not mandated by TAP and TAF.

12.9 Train Identifiers
12.9.1 Identification of the train

With the full implementation of TAP and TAF the messages used in the Path Request will need to follow the Train Identification convention that will be applied as mandatory. It is a composite set of identifiers that uses the following:

- **Train ID.** A unique ID provided by the RA that stays with train throughout the different planning activities and beyond into Operation. The link between Path ID and Train ID is confirmed/ fixed with the Path Confirmation Message.
- **Path Request ID** – A unique ID provided by the RA when making the path request (staying on through the whole planning process). After a path is booked, any request for Path Modification by the RA (planning or operation) must use a new PathRequest Identifier.
- **Path ID.** A unique ID provided by the IM when offering a requested path
- **Case Reference ID** – A unique ID that can be used to identify business cases that cover one or more trains that have been requested and can be used by both the RU and IM. For example, an RA requests a regular set services for a train travelling A – Z and then Z – A. The RU uses one single Case Reference ID for both services but there will be two separate trains, one for A – Z and another for Z – A. For more explanation see chapter 8.2.3.4.

Within the “Identifiers” section of the messages, it is recommended that only one ID with the same ID type should be used (except Case Reference)). The exception is the related Identifiers, where more than one relation can be represented.

Currently TAF/TAP regulation does not stipulate the use the Train Identifiers as mandatory for the initial implementation. However, provision has been made in the planning messages to allow the use the composite identifier. It is therefore possible, that for the initial implementation and up to the point where the use of Train Identifiers becomes mandatory, to use tailored identifiers as defined by the Actors and represented in the TAF and TAP message catalogues.

The use of a legacy identifier such as the ‘Operational Train Number’ as an identifier during the planning and operational phase will be possible for use as by an RA or IM for train identification until the proposed structure of the Train Identifiers has been implemented as a mandatory requirement.

For some Actors the initial implementation may see them using a combination of the Train Identifiers and the legacy identifiers as per their national regulations relating to train identification.

Further details on the aims and usage of the different identifiers throughout the different processes are explained in Chapter 8 of this document where also the link to the description of the TrainID is made.
12.9.2 Related Trains as Part of Train Identification Section

Within the Train Identification Section there are elements that are able to identify other trains that are related to the train in the Message itself. This is to show the relationship for business activities that are related to the train identified in the path request. This includes for example the following scenarios:

- identifying the train with an earlier request e.g. a path study
- identifying connecting services
- induced traffic

These elements are held in the Train Identification Section of the Message and can be identified with a prefix e.g. “Related to other …”. They are used as follows

- …Case reference IDs. the path request is related to the case reference of one or more other trains that are related
- … Planned Train ID – the path request is related to one or more single trains
- … Path IDs – the path request is related to one or more (other) specific path
- … Path Request ID – the path request is related to another (earlier) path request

Within the related identifier section, more than one ID of the same type can be transmitted. It is currently under analysis of the sector how to indicate the purpose of the particular identifier in the “related identifiers” section.

12.9.3 Related Trains as Part of Train Activity

It is also possible to include other trains identifiers in a Message based on a relationship as a result of a specific train activity. Within the Train Activity section, it is possible to identify one or more trains as a result of specific activities that can take place on a location within the schedule.

If the Activity Code is related to another train, then one or both of the elements “associatedTrID” and/or “associatedOTN” (that is relevant for the transition to TrID) will need to be completed.

For example, it is possible to identify another trains that are related to each other as a result of “Connecting service to other train” (0044)/“Connecting service from other train” (0045) train activity that can take place at a specific train location.

12.10. Messages for Short Term Path Request

12.10.1 General remarks to all Messages

- An error (as defined by the codes used for Error Message (Annex 10.2)) identified for an optional element will have to be treated in the same way as an error for mandatory element. It will have to be corrected and then resubmitted following the normal process if required.

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• A message may contain an indication on the event in the business process. This is driven from the business context point of view in order to inform the recipient of this message regarding the consequence of the process activity that has just taken place (e.g. ‘No alternative available’ in the message ‘path details’). For this purpose, the element TypeOfInformation is used.

• All messages have an element “Message status” that identifies its current status (‘creation’, ‘modification’, ‘deletion’). This status is generated and subsequently updated only by the system as a result of process activity step that has taken place (e.g. ‘modification’ in the case when the RU changes a train parameter in the message ‘path request’ and re-submits the request).

• TypeOfRequest element indicates which process should be applied: Path Request, Path Study or Path Modification. The element TypeOfRequest is used in all messages. When TypeOfRequest is used in Path Details message by IM, and the type “Path Modification” is used, it indicates the Path Alteration process (in the same way as it is used for Path Request to indicate that there is the Path Modification process ongoing).

### 12.10.2 Structure of the Message

This section aims to give a brief overview of the main message elements:

**Message header**
The message header is common for all RA/IM messages and therefore has no business relevance related to Short Term Planning process. It is purely a technical part of the message. See chapter 11.

**Identifier**
This element group holds the composite identifiers for Train ID, Path ID, Path Request ID and Case Reference ID and any other related identifier that interacts with e.g. related Train ID could well be the one of another train that is attached to the main train during its journey.

**Train information**
This element group is used to facilitate the harmonisation between the involved RAs, IMs and to be used for information publication needs. The train information element contains the following information related to the train

• Schedule for the entire journey which includes all the key locations (Origin, final destination, interchange, handover, points with commercial stops) and their timings and activities.
**Path Planning Reference Location** indicates the point from which the timetable needs to be planned to/from

- It is not always at the origin of a train run where the path planning starts. It may happen that an RA received a specific slot in a terminal at the final destination. In this case, the path planning is done backwards. The planning could also start in an interchange point in the middle of the journey based on an optimal engine circulation program. Therefore the (lead) RA has the possibility to choose the start of the path planning, according to the particular business case.

The calendar provided in the Train object still represents the dates of departure at the first location provided in the Train Information. It means:

- if the reference location is within the scope of the IM, the IM should start planning calculation from the reference location for the calendar calculated the following way: provided calendar in the request + offset at the location in the request which corresponds to the reference location in the Train Information
- If the reference location is outside the scope of IM, the IM should start planning calculation from handover point for the calendar calculated in following way: the calendar in the request + offset corresponding to the handover point which is closest to the reference point.

**planned train technical data** which refers to the composition of the train and other technical parameters for the entire journey from the origin of the train until its final destination and the eventual change of composition and/or technical parameters during the run of the train. This is used for harmonization and information. The technical parameters for the path construction are derived from the Path Information Section.

**Path information**
This element group is used as a mechanism of communication by the RA and IM which holds the details from RA for each Path section or offered/booked journey section from one IM. The journey section starts at the origin of the train or at the handover point between IM’s and ends at final destination or at the next handover point. This consists of all points that are specific to the Path Section (e.g. Station Stops, Run Throughs, Handover Points).

The data in the Path Information section is used to construct the path (from Path Request) and to inform about the offered path (in Path Details). The Planned Journey Location structure has the same elements as the train information. The Path Information section carries the calendar but, differently as in Train Information, it does not carry the “Reference Point”. In the Path Information section, the reference point for calculation of the offsets in the calendar is the first point of the Planned Journey Location array.

**Status of Harmonisation**
This element identifies the type of harmonisation (Full, Partial). A dossier (especially path request and/or path details) may be fully or partially harmonised. This attribute indicates the relevant status.
In case of just one single RA and one IM where the train is travelling in one network only, either “full” or “none” can be used, but not “partially”.

**On Demand Paths**

The usage of “on demand paths” is optional and subject to national rules. It has to be activated by RA for use of the path.

**Operational Train Number (OTN)**

This element, OTN, is given by the IM to the RA as soon as the foreseen OTN is known, at the latest before operation (before train preparation phase) by updating the message “Path Details” (status “modification”). In some networks it can be provided beforehand by the RA as part of the Path Request in conjunction with the IM. The OTN is seen as an attribute of the Path object and therefore it is contained in each path section (on each Planned Journey Location element level). Technically speaking, in the XSD it is an optional element since the RA may indicate the OTN in the path request in the conjunction with IM as indicated above. On the other hand, it is likely that the IM will treat the OTN as a mandatory part of each path section when the path details are provided to the RU, especially if the OTN is changed from one path section to another.

**Network Specific Parameters section**

This element group may be used for specific attributes which are not mandatory on all networks and can be used bilaterally by the RA and IM. This element group should only be used between an RA /IM on a national section when it is absolutely necessary and where no common element in the main message can be identified. Otherwise there is a danger that the RA /IM could start using elements in this group and not use the elements from the common sections.

Before a company creates a Network Specific Parameter element it is required that the company checks the use of the element with the governance entity and its relevant work groups who will advise them if no common element can be created. See also chapter 22.

**Affected Section**

This element group will be applied only in case of planning activities related to the full or partial path cancellation, alteration or utilisation notification of a path section.

Affected section is a part of the path and it’s defined by the start point of section (first point) and the end point of section (last point), where start point and end point appear only once in the section optionally with its BookedLocationTime (planning) or BookedLocationDateTime (operation) to avoid ambiguity, and is effectively used for identifying a specific train that is within a section.

Affected section is also carried in the messages as an array, and therefore serves to indicate which sections are affected as precise as possible. The level of the detail indicated by the array of affected sections should be the same as in the Path Information section of the Path object delivered in the Path Details message.
12.11. Overview of the messages

This section aims to give a brief overview of the messages, in particular showing the status of the message as governed by the process activities.

<table>
<thead>
<tr>
<th>Message</th>
<th>Relevant for TAP and TAF</th>
<th>Outside the TAF or TAP regulation, but recommended [developed from best practice in the rail sector]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path Request</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Path Details</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Path Confirmed</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Path Details Refused</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Path Cancelled</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Path Not Available</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Path Coordination^21</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Path Section Notification</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Error^22</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Path Utilisation notification^23</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Receipt Confirmation</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

12.11.1 Message ‘Path Request’

This message is used for the following actions:

- original path request from RA to IM with status ‘creation’
- path request with status ‘deletion’ in case the request is withdrawn until the IM has sent a PathDetails message
- path request with status ‘modification’ in case the RA wants to modify an element contained in the previously created and sent message until the IM has sent a PathDetails message

12.11.2 Message ‘Path Details’

This message is used for the following action(s):

- path details from IM to RA with status ‘creation’ for an indication ‘offered’ (this includes draft offer, final offer). If a draft offer turns into the final offer the status of the message will be alteration with an indication “Final offer”.
- path details message with status ‘creation’ for an indication ‘no alternatives available’
- path details message with status ‘creation’ for an indication ‘booked’
- path details message with status ‘modification’ for an indication (e.g. type of information = booked) of the path contract, at the end of the Path Alteration or Path Modification process, which is executed after the path allocation.
- The final Path Details message contains all data needed for the train run, i.e. the timing at all operational points along the train journey.

^21 Rejected by Change Control Management
^22 Approved by Change Control Management
^23 Rejected by Change Control Management and replaced by Path Section Notification
12.11.3 Message ‘Path Confirmed’
This message is used for the following action:

- path confirmation from RA to IM with status ‘creation’

12.11.4 Message ‘Path Details Refused’
This message is used for the following action:

- refusal of path details from the RA to IM with status ‘creation’

12.11.5 Message ‘Path Cancelled’
This message is used for the following action:

- (partial or full) path cancellation from RA to IM with status ‘creation’

12.11.6 Message ‘Path Not Available’

‘Path Not Available message’ means the path cannot be used.

If an alternative path is available, the TypeOfInformation 23 must be used and, together with this message or as soon as that path is known, the IM must send without any further request from the RA an alternative proposal. This is done with the ‘Path Details message’ related to this ‘Path Not Available message’.

If an alternative proposal is not possible, the IM must inform the RA immediately.

This message is used for the following action:

- Information from IM to RU that the booked path is not available
  - Message Status: Creation
  - Type of Request: Modification
  - Type of Information:
    - Code 23: draft offer in preparation
      This type of information is used when the IM is able to provide the alternative path. It means, a PathDetails will follow.
    - Code 21: no alternative available
      This type of information is used if it is not possible for the IM to provide an alternative to the path that is not available any more. This is used only in the cases like natural disaster (e.g. the bridge is broken, or the tunnel is closed)
12.11.7 Message “Path Coordination”\textsuperscript{24} and ‘Path Section Notification’\textsuperscript{25}

These messages are in addition to TAF and TAP. They follow best practice from the sector and are therefore recommended although it is not mandated by TAP and TAF. They are used for the following actions:

- Holds the objects and elements related to the Short-Term Path Request process by keeping them up to date among the partners
- For the purpose of coordination. One is containing all planned journey \textit{locations} of train and path and the another one is strictly related to path \textit{sections}
  - Path Coordination Message* is linked with the messages Path Request, Path Details, Path Confirmed, Error. and holds the information related to train passing each of the locations of the entire train journey and the related path information
  - Path Section Notification Message** is linked with the messages Path Cancellation, Path Not Available, replaces Path Utilisation Notification and holds information related to path either for all path sections or for the specific sequence of sections of the path

12.11.8 Message ‘ErrorMessage”

This message follows best practice from the sector and is therefore recommended although it is not initially mandated by TAP and TAF. It has been processed as a change request by ERA CCM Working Party and accepted to be contained in the Common Metadata XSD 2.1.

It is used for the following action:

Error message will be sent in return in cases an IM receives an RA message indicating that

- functional elements based on business rules (e.g. no path details mandatory elements missing, etc.) are wrong or missing
- technical elements (e.g. system failure) are wrong or missing
- both above mentioned are wrong or missing

In the same way, the RA can send the Error Message to the IM in the case of the incomplete offer or any other reason known to both parties to be the error source.

The Error Message has elements with defined coding structure for Type of error, Severity and Error Code. For further description of the Error message in itself see also 12.14.15.

In one Error Message, several Errors (an array!) can be contained. This is done for the purpose of avoiding unnecessary communication about the errors, if several errors are linked to the same source and would have been sent one after another anyhow.

\textsuperscript{24} Rejected by Change Control Management
\textsuperscript{25} Rejected by Change Control Management
Nevertheless, the error handling is up to the bilateral or multilateral agreement between the partners in the communication. If the partner still insists on sending the separate error messages for each error, it is possible with the message structure as well.

Note: ErrorMessage has replaced the “AnserNotPossible” message. The ErrorMessage as such can be used in any TAF/TAP procedure, it is not limited only to the path request related processes. The list of error codes is given in the Annex 10.2.

### 12.11.9 Message ‘Path Utilisation notification’ is replaced by Path Section Notification

This message is in addition to TAF and TAP and it has been rejected by the ERA CCM Working Party since the procedure of activation of the pre-booked paths is used only by some IMs within the TAF/TAP stakeholder community. Therefore, the sector decided to replace this message by the Path Section Notification message and to use the “type of information” element accordingly.

- RA requests to the IM to activate or de-activate a path with message element “Type of information” and code for “utilisation notification”

Some networks offer the possibility to book an optional path in advance. This means, that capacity has been allocated to an RA who has to activate it in order to run the train or to de-activate in case the train is not running.

Additionally, this message is utilized in the Operations for the applications such as RNE TIS. It contains on the message level the **optional** element “Scheduled Date Time at Transfer Point”. This information is currently needed in the daily business when using applications such as TIS. The above-mentioned element is used as a key element for compiling single message to one entire train Practically speaking, it is used within the TAF TSI Framework also as the replacement of the UIC Train Failure message. The optional element is only used in Operations for communicating the train failure on the specific path. In the Planning phase, this element is not needed.

### 12.11.10 Message ‘Receipt Confirmation’

According to TAF and TAP this message should be sent from the recipient of the message to the originator of the message in order to acknowledge that its legacy system has received the message.

To identify which message is confirmed by the legacy system, the related reference of the actual message sender can be added in the RelatedSenderReference element.

This is required for purposes described in the Regulation where it is important to know at which point in time does the message arrive at receiving systems e.g. when a path request reaches a legacy system of an IM it has several days to plan and offer back the path.

### 12.12 Elements specific to actors

Key element data of the RAs, the content as for example train parameters, commercial information, cannot be changed by the IM or key element data of the IMs (e.g. received
on time, maximum planned speed) by the RA. The data in these elements will be only passing through the messages and should not be allowed to be changed during the other stages of the process. For this purpose, the messages Path Request and Path Details have the structure to protect the data according to actors. Path Request message contains Train Information section to carry the train object data, and Path Information section to specify the all necessary details of the path request for the particular train. The Path Details message contains only Path Information section in order to be as precise as possible and to avoid the situation that the Train Information section, which is owned by RA is changed by IM.

A list of the key element data ownership can be seen in Annex 12.2.

It is up to the implementers to ensure that the mechanism of access control/validation is carried out according to their needs.

12.13 Business Scenarios

This section provides examples of specific real-life scenarios for a number of the different activities that take place during the planning phase. It shows how messages will be utilised during the communication between the RA and IM at the various stages of the exemplified scenarios.

In all examples described below the use of TrainID/OTN will only be shown where there is references to other trains being involved within the scenario e.g. attach train. This is because this section aims to focus the reader on the scenario itself as opposed to how the scenario works together with train identification – these are covered in other TAF/TAP documentation such as the Handbook on Train Identification, referenced in chapter 8. Additionally, the test cases (Appendix 8.6 and 8.7.1) for the TrainID cover some of the business scenarios given here, from the aspect of identifiers.

12.13.1 Ordinary train running across two IMs networks

Situation

Paths for a train are requested from A via B (commercial stop), C (no commercial stop but change of staff), D (change from IM a to IM b, run through only), to F. Location E is added by the IM as an additional operational location.
Preconditions

- Open access business model
- Handover point = Location D (which is a run through only)
- Location E is an additional run through location that is added by IM b to define the route and operational information
- Train composition is the same
- Change of crew at location C (Operational activity requested by the RU at the beginning)
- Information needs to be published as normal

Approach

The aim of this approach is to provide efficient RA /IM communication where a train is being requested to run across two different networks.

One approach for handling the RA and IM communication is described for this scenario and is explained as follows:

RA communicating with the IM
The RA sends one path request message to IMa for the section A – D (handover point). The path request message is sent with a Train Information section that contains all commercial stops (A, B, F), station C, handover point D and destination point F. The path request message is sent with a Path Information section that contains Stations A, B, C, and Handover point D. In this scenario in the Path Information section it is also mandatory to enter the activity type code for ‘Crew Change’ at Location C. In the Train Information section, it is optional for the RA to enter the activity type code for ‘Crew Change’ at Location C.

The RA sends one path request message to IMb for the section D. F. The path request message is sent with a Train Information section that contains all commercial stops (A, B, F), station C (where the train has to stop according to RU request), handover point D and final destination F. The path request message is sent with a Path Information section that contains Handover point D, run-through point E and final destination F.
**IM communicating with the RA**

IMa sends one path details message to the RA for the section A – D. The Path Details message is sent with a Path Information section that contains Stations A, B, C, and Handover point D.

IMb sends one path details message to the RA for the section D. F. The path details message is sent with a Path Information section that contains Handover point D, Station F and in the run-through Location E.

**How it looks like in the message:**

An example is shown in Annex 12.3
12.13.2 Ordinary train running across two networks

Situation

Paths for a train are requested from A via B (commercial stop), C (no commercial stop but change of staff) RU interchange point), D (change from IMa to IMb, run through only), E (run through only) to F.

<table>
<thead>
<tr>
<th>RAa</th>
<th>RAb</th>
<th>RAb</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMa</td>
<td>IMa</td>
<td>IMb</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F</td>
</tr>
</tbody>
</table>

Preconditions:
- Cooperation business model (2 RA involved)
- RAa takes the lead RU role in this scenario
- There is a need for RU harmonization (not yet done e.g. in timetabling conference)
- RAb requests the run through Location E in the Path Request
- Handover point = D (run through only)
- Train Composition is the same
- Change of Crew at Location C (Interchange point, Operational Activity)
- Information needs to be published as normal

Approach

The aim of this approach is to provide efficient RA/IM communication where a train – operated by two cooperating RA – is being requested to run across two different networks.

One approach for handling the RA and IM communication is described for this scenario and is explained as follows:

RA communication with cooperating RU
RAa (leading/coordinating RA) sends the Path Coordination message to RAb to start the harmonization between the RAs before placing a path request. This message is sent with a Train Information section that contains all commercial stops (A, B, F), station C, run through Location E and handover point D.

RAa communicating with the IM
RAa sends one path request message to IMa for the section A – D. The Path Request message is sent with Train Information section that contains all commercial stops (A, B, F), interchange point C, run through Location E, handover point D and the Path Information section that contains Stations A, B, until interchange point C. In the Path Information section, it is also mandatory to enter the activity type code for ‘Crew Change’ at Location C, if known. In the Train Information section, it is optional for the RU to enter the activity type code for ‘Crew Change’ at Location C.
RAb sends one path request message to IMa for the section C,D and the second Path Request message to IMb for the section D. F. The first path request message is sent with Train Information section that contains all commercial stops (A, B, F), interchange station C, run-through Location E, handover point D and the destination point F. The Path Information section contains C and D. The second Path Request message has the same Train Information block but contains in the Path Information the locations from handover point D, run through location E to the station F.

**IM communicating with the RA**
IMa sends one path details message to RAa for the section A – C. The path details message is sent with a Path Information section that contains Stations A, B, C.
IMa sends the second Path Details message to RAb for the section C, D.
IMb sends one path details message to RAb for the section D. F. The path details message is sent with a Path Information section that contains Handover point D, run through location E and Station F.

**How it looks like in the message:**
An example is shown in Annex 12.3
12.13.3 Splitting of a train

Situation

Paths for a train are requested from A via B, C, D, E to F and Z. The train is formed of two portions (e.g. two train sets) running jointly from A to E. In E (commercial stop), the train has different routes: one portion continues to F, the other portion to Z.

1) The trains on the path sections E.Z and E.F have the same train calendar (run on the same days)

Preconditions

- Open Access business model
- Handover point = D (run through only)
- Train composition change and commercial stop in E.
- Location B, C are run though locations, requested by the RU
- Information needs to be published about the two trains and then the train split at Location E

Approach

The same running days on E-F and E – Z (overlapping calendar)

The aim of the approach described below is to provide efficient RA/IM communication where a train is being split during its journey. There are many ways to communicate, however the simplest and most generic approach is to treat this scenario as two trains, the main train (A – F) and the second train (E – Z). This approach for handling the RA and IM is explained as follows:

RA communicating with the IM

The RA sends one path request message to IMa for the section A – D. The path request message is sent with a Train Information section that contains the commercial stops (A, E, F), handover point D the splitting point E and the final destination F.
The path request message to IMa is sent with a Path Information section that contains stations A, B, C and Handover point D.

The RA sends two path request messages to IMb. One for the main train (A – F) and one for the second train (E – Z). The first path request message is sent with a Train Information section that contains the commercial stops (A, E, F) and handover point D for the main train. The Path Information section of the first message contains the section D, C.F. The second Path Request message is sent with the Train Information and E, Z for the second train. For the main train the Path Information section contains stations E and F as well as the Handover point D. In the Path Information section, it is also mandatory to enter the activity code for ‘train split’ and add the associated/attached train code at Location E, while it is optional for the RA in the Train Information section. For the second train the Path Information section contains stations E and Z.

**IM communicating with the RA**

IMa sends one path details message to the RA for the section A – D. The path details message is sent with a Path Information section that contains stations A, B, C and Handover point D.

IMb sends two path details messages to the RA, one for the main train for section D – F and the other for the second train for section E – Z. For the main train the Path Information section contains stations E and F as well as the Handover point D. For the second train the Path Information section contains stations E and Z.

**How it looks like in the messages:**

The messages layout can be examined in the reference system PCS. For this purpose, use the documentation for the test cases. We recommend to reader to validate the Test Cases in the Annex 8.6 and Annex 8.7.x. Annex 8.7.1 contains the general test cases provided by the TEG TrainID members, and Annex 8.7.2 contains the test cases which will be used in the Joint Sector Pilot Program for Short-Term Path Request and TrainID. The test cases contained in 8.7.2 are the simple test cases aimed to reflect the basic steps and information exchange within the Short-Term Path Request process with Identifiers.

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26 Joint Sector Pilot Program for Short Term Path Request and TrainID has started in April 2017 as the common initiative of the sector organisations and stakeholders represented in the Joint Sector Group (JSG). Details and updates will follow on the JSG website in fall 2017, when all the plans of the stakeholders participating in the program will be published.
12.13.4 Attaching of a train to another train

Situation

Two trains are running A – F, Y – F jointly coupled between B and F. The train is formed of two portions (two train sets) running jointly from B to F. Both parts run individually from A – B and Y- B. In B they are attached at the commercial stop, the trains are joined and become one train.

Joining of two trains

A \[\rightarrow\] B \[\rightarrow\] C \[\rightarrow\] D \[\rightarrow\] E \[\rightarrow\] F

Y

Preconditions

- Open Access business model
- Two Trains attach in Station B
- Location C is a run though location
- Handover point = D (run through only)
- Both Trains runs from B to F in one combined train set
- Information needs to be published about the two trains attaching at Location B

Approach

The aim of the approach described below is to provide efficient RA/IM communication where two train sets are joining to create a combined train set for the rest of its journey. There are many ways to produce the efficient communication, however the simplest and most generic approach is to treat this scenario as two trains, the main train (A – F) and the attached train (Y – B). This approach for handling the RA and IM is explained as follows:

RA communicating with the IM

The RA sends two path request messages to IMa one from A to D for the main train (A – F) and the other from Y to B for the attached train (Y – B). For the main train the path request messages is sent with a Train Information section that contains all commercial stops (A, B, C, E, F) and handover point D. The path request message for the main train (A – F) is sent with a Path Information section that contains stations A, B, C as well as the Handover point D. In the Path Information section, it is also mandatory to enter the activity type code for ‘0016 attach train’ at Location B in the message for the section A – D, while it is optional for the RU in the Train Information section. The related train identifier/OTN (for the attached train) that will be attached at Location B will also be added into the Train Activity section.
For the attached train Y – B the path request message is sent with a Train Information and Path Information section of Y and B only. The related train identifier/OTN (for the main train) that the train will be attached to will also be added.

The RA sends one path request message to IMb for the section D - F. The path request message is sent with a Train Information section that contains all commercial stops (A, B,
C, D, E, F) and handover point D. The path request message is sent with a Path Information section that contains station F and Handover point D.

**IM communicating with the RA**
IMa sends two path details messages to the RA, one for the main train for section A – D and one for the second train Y – B. The path details messages are sent with a Path Information section that contains A, B, C, D in the message for the main train and stations Y and B for the attached train.

IMb sends one path details message to the RA for the section D - F. The path details message is sent with a Path Information section that contains E and F and Handover point D.

**How it looks like in the message:**
An example is shown in Annex 12.3
12.13.5 Trains with different routes on specific days

**Situation**
Paths for a train are requested from A via B, C, D, E to F. The train only runs on Sundays between A and B, but daily between B and F.

Train with different routes per day

A → B → C → D → E → F

- Sundays only
- Daily

**Preconditions**
- Open Access business model
- Train Composition is the same for the different calendars
- No specific operational activities taking place
- Information needs to be published for the two trains

**Approach**
The aim of this approach is to provide efficient RA/IM communication where a train is being requested to run across two different networks for different running days and having extended locations on some of the days.

This approach is only one method of handling the RA and IM communication for this scenario. There are other approaches that can be implemented, e.g.

- Approach 1: Treated as two different trains with different calendars (A – F & B – F)
- Approach 2: Sunday train (A.B) linked with the daily train (B – F)

Approach 1 is described as follows:

**RA communicating with the IM**
The RA sends one path request message to IMa for the section A - D with a calendar element showing all Sundays (and the first TrainID) and another path request message to IMa for the section B - D, with a calendar valid for all days except Sundays (and the second TrainID). The two path request messages are sent with different Train Information sections (A – F for the Sunday Train and B – F for the Daily except Sunday train) and different TrainIDs as stated before. The two path request messages are sent with different Path Information sections (A – D for the Sunday Train and B – D for the Daily except Sunday train).
The RA sends one path request message to IMb for the Sunday train and another path request message for train running every day except Sunday. The two path request messages are sent with different Train Information sections (A – F for the Sunday Train and B – F for the Daily except Sunday train) and different TrainIDs. The messages are sent with the same content in the Path Section (D – F) but different calendars (once only Sundays, and once for all other days except Sunday).

It is recommended to use the RelatedPlannedTransportIdentifier (with specific reason) to indicate that the RA wishes to get the same route and details for both Path Requests.

**IM communicating with the RA**

IMa will send back two path details messages one for Daily except Sundays train (B – D) and one for Sunday (A – D).

IMb will send back two path details messages one for Mon – Sat (D – F) and one for Sunday (D - F). This could be the same path but could also be two different paths. Hence, IM can decide about the usage of one PathID or two PathIDs (depending on the decision on one or two Path objects respectively). Nevertheless, it is important for both RA and IM to keep the record about the links between Train and Path objects.

**Approach 2**

The approach 2 covers the case where the Path Request is split to two requests according to the geographical aspect, not the calendar (The path for the Train A-B (Sundays) is requested, the path for the train B-F is requested for all days including Sunday).

**RA communicating with the IM**

The RA sends the first Path Request to IMa for the section B.D and the calendar containing all the days (including Sundays) with the first TrainID. The TrainInformation and the Path Information contain the same route B.D.

The RA sends the second Path Request to IMa for the relation A-B for Sundays with the second TrainID. TrainInformation block carries only the section A.B and the calendar containing Sundays. The Path Information section also carries only the section A-B and the calendar containing Sundays.

**IMPORTANT:** On the point B, the Train Activity Type Code must carry the information about the AttachedTrainID. Attached OTN will be difficult to provide since the OTN is finally established after the Path Request only by IMs, not by RA. RU may indicate an OTN that is usually used for the particular train type (e.g. repeating train numbers in passenger traffic or according to train number contingents agreed between IM and RA).

The disadvantage of this approach is that the one on the same train that runs on Sunday through location B will have two TrainIDs. This will make the tracking and tracing of the train more difficult. We cannot rely on the repeating numbers or number contingents since these are not covering all the cases in the whole Europe.

**12.13.6 Change of a booked train for certain days (e.g. planned re-routing)**

**Situation**

Paths for a daily train have been booked from A via B, C, D, E to F. The booked train runs daily. The RU originally wishes commercial stops in A, B and F
During the running period of the train, closure of station B is necessary for one day on short notice. The train has to be re-routed via X and will leave earlier in A (relates to the process “Path Modification by IM”).

**Change of a booked path**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
</table>

Originally booked daily:

**Change of booked path on one day only:**

| A | X | C | D | E | F |

**Preconditions**

- Open Access business model
- Handover point = D (run through only)
- Standard RA /IM communication for the initial path booking
- Train Composition is the same
- Information needs to be published as normal
- Information will be updated after the disruption – Closure of Station B
- Closure of B is supposed to be known after the path request made by RU
- Closure of station B is supposed to be known before the sale of the tickets begins for the day of B closure
- The closure of Station B has no impact to the path of IM b

**Approach**

The aim of this approach is to provide efficient RA/IM communication where a train is being requested to run across two different networks for different running days and being rerouted one day.

One approach for handling the RA and IM communication is described for this scenario and is explained as follows:

**IM communicating with the RA**

When the closure of Station B is known IMa a sends the Path Not Available with type 23 message to RA informing that Station B will be closed for one day.

It is recommended to send the PathNotAvailable for the whole path in IM territory. The affected Section starts at A and ends at D and includes B.

The Calendar will be for the one day of closure (Validity Period of one day).

As soon as possible IMa sends an alternative Path Details message for the whole path with Location X in the section (A – X – C – D) for the one day any altered timings will also be included in the message.
RA communicating with the IM
The RA is advised to answer to PathNotAvailable with the Receipt Confirmation message to the IM. The RA should answer which PathConfirmed or PathDetailsRefused messages to the IMs Path Details message with the alternative route. The rest is the matter of the agreement between RA and IM which is usually regulated through IMs’ Network Statement.

12.13.7 Trains with Through Coaches

Situation
Paths are requested for a train A via B, C, D, E to F. Some coaches of the train are detached in E. These coaches are attached to another train from W via E to Z. Through coaches (coach groups) from A to Z are established.

Preconditions
- Through coaches in a station of IMb
- Train W – Z a priori unknown from IMa
- Trains A – F and W – Z are nevertheless associated

Approach
The aim is to provide efficient RA /IM communication, where two different trains stop at the same station, in order that a coach is detached from one train and attached to a second train.

RA communicating with the IM:
A Path Request Message is sent by the RA to IMa. The Train Information contains the Activity Code at Location E “Detach Coach”.

A Path Request Message is sent by the RA to IMb for train (A – F). The Message has to indicate that a coach is detached in Location E via the Activity Code “Detach Coach”. The
related TrainID and/or OTN on which the attached Coach will be added (train W – Z) at E will also be added into the Train Activity section.

```xml
<PlannedJourneyLocation JourneyLocationTypeCode="02">
  <LocationPrimaryCode>45000</LocationPrimaryCode>
  <PrimaryLocationName>E</PrimaryLocationName>
  <TimingAtLocation>
    <Timing TimingQualifierCode="ALA">
      <Time>14:25:00.0</Time>
      <Offset>0</Offset>
    </Timing>
    <Timing TimingQualifierCode="ALD">
      <Time>14:35:00.0</Time>
      <Offset>0</Offset>
    </Timing>
  </TimingAtLocation>
  ...
</PlannedJourneyLocation>

The Path Request Message sent by the Applicant to IMb for the other train (W – Z) has to indicate that the train in station E receives a coach from train A – F (related identifiers section: attached train’s TrainID). The Message has to indicate that a coach is attached in Location E via the Activity Code “Attach Coach”. The related TrainID and/or OTN on which the attached coach came from (train A – F) at E will also be added into the Train Activity section.

IM communicating with the RA:
A Path Details Message is sent by the IMa back to the RA.

Two Path Details Messages are sent back by IMb to the RA. The Path Details Message is sent by the IMb back to the RA for Train A – F. The Message has to indicate the times at station E, and the TrainID and/or OTN of the train for which the coach is attached to (train W – Z). The Path Details Message is sent by the IMb back to the Applicant for Train W - Z. The Message has to indicate the times at station E and the TrainID and/or OTN of the train for which the coach is detached (train A – F).
12.13.8 Trains that cannot leave before another train has arrived (diagram dependence)

**Situation**

Paths are requested for two trains: A to F and F to A. The RU has to use the same physical train set; therefore, the second train cannot leave F before the first train has arrived in F.

![Diagram showing train paths from A to F and F to A with IM a and IM b]

**Preconditions**

- Open Access business model
- Handover point = D (run through only)
- No commercial stops except A & F
- Train Composition is the same (same physical train set). RA requires the IM to take this into account.
- Considered as two different trains where Train A – F is planned before Train F – A
- Running days of train A – F are the same as for F – A

**Approach**

The aim of this approach is to provide efficient RA/IM communication where a train is being requested to run in one direction, known as the first train (A – F), and then the train runs again (as a different service) in the reverse direction, known as the next train (F – A).

One approach for handling the RA and IM communication is by showing train activities (Next Working) to link the two trains (including the use of related Train IDs and/or OTNs). This scenario is explained as follows:
**RA communicating with the IM**

**For the first train (A to F)**
The RU sends one path request message to IMa for the path section A to D. The path request message is sent with a Train Information section contains commercial stops (A, F) and handover point D.

At Location F the train activity type code for the TrainInformation "Next Working Service" is entered, together with associated attached Train ID and/or OTN of the next train. The path request message is sent with a Path Information section that contains Commercial Stop A and handover point D.

The RU sends one path request message to IMb for the path section D to F. The path request message is sent with a Train Information section contains commercial stops (A, F) and handover point D.

At Location F the train activity type code for the TrainInformation and PathInformation "Next Working Service" is entered, together with associated attached Train ID and/or OTN of the next train. The path request message is sent with a Path Information section that contains Commercial Stop F and handover point D.

**For the second train (F to A)**
The RA sends one path request message to IMb for the path section F to D. The path request message is sent with a Train Information section contains commercial stops (F, A) and handover point D.

At Location F the train activity type code for TrainInformation and PathInformation "Previous Working Service" is entered, together with associated attached Train ID and/or OTN of the previous train. The path request message is sent with a Path Information section that contains Commercial Stop F and handover point D.

The RA sends one path request message to IMa for the path section D to A. The path request message is sent with a Train Information section contains commercial stops (F, A) and handover point D.

At Location F the train activity type code for TrainInformation "Previous Working Service" is entered, together with associated attached Train ID and/or OTN of the previous train. The path request message is sent with a Path Information section that contains Commercial Stop A and handover point D.

**IM communicating with the RA**
IMa sends one path details message to the RA for the section A – D. The path details message is sent with a Path Information section that contains Commercial Stop A and handover point D.

IMb sends one path details message to the RA for the section D – F. The path details message is sent with a Path Information section that contains Handover point D and Station F.
12.13.9 Trains that need to be shunted from one platform to another at a location during the train run

**Situation**

Paths for a train are requested from A via B to F. At B, the train needs to arrive at track 1 but has to leave from track 9. In reality, the train is shunting out of track 1 into track 9 and continues to the next station from track 9.

![Diagram showing train paths and shunting](image)

**Preconditions**

- one RA and two IM (IMa, IMb)
- assumption daily train
- unchanged composition in B
- train change platform because of track layout
- publication as through train
- Passengers can only alight on track 1 in location B

**Approach**

The aim of this approach is to provide efficient RA/IM communication where a train is being requested including shunting according to the track plan of station B and followed to run across two different networks.
RA communicating with the IM

The following is just an example on how to handle the business scenario. Every solution is depending on national rules.

The RA sends one path request message to IMa for the section A – D with the path information section showing two subsidiary locations at BO one primary location with an attached subsidiary location at B showing track 1 (LS1) with an arrival and a departure time and the same primary location this time with a subsidiary location for track 9 (LS9) including a departure time. The train information section contains all commercial stops (A, B, C, D, E, F). There will be a Train Activity Type as a shunting operation for each location at B.

The path request message is sent for train running every day, else without any other difference.

The RA sends one path request message to IMb for train running every day from D – F.

The train information section contains all commercial stops (A, B, C, D, E, F). The path information section contains D, E, F as ordinary stops.

IM communicating with the RA

IMa will send back one path details message for running every day from A to D, including both subsidiary locations at B (LS1 and LS 9) and their relevant times.

IMb will send back one path details message for D – F.

In XML (Path Information block) it looks as follows:

```xml
<PathInformation>
  <PlannedJourneyLocation JourneyLocationTypeCode="01">
    <LocationPrimaryCode>10000</LocationPrimaryCode>
    <PrimaryLocationName>A</PrimaryLocationName>
    <TimingAtLocation>
      <Timing TimingQualifierCode="ALD">
        <Time>06:00:00.00</Time>
        <Offset>0</Offset>
      </Timing>
    </TimingAtLocation>
    ........
    <TrainActivity>
      <TrainActivityType>0001</TrainActivityType>
    </TrainActivity>
    <OperationalTrainNumber>0001234</OperationalTrainNumber>
  </PlannedJourneyLocation>

  <PlannedJourneyLocation JourneyLocationTypeCode="02">
    <LocationPrimaryCode>20000</LocationPrimaryCode>
    <PrimaryLocationName>B</PrimaryLocationName>
  </PlannedJourneyLocation>
</PathInformation>
```
This section provides the specific business rules/conditions on how specific elements within the messages will need to be applied for certain situations.

The business rules for applying the calendar are explained in 12.15.

12.14.1 Train Weight/Train Length

Determining the Train Weight

If the “Traction Weight” and the “Weight of the set of carriages” are both entered into the message, the “Train Weight” can be calculated as the sum of the two elements.

If the “Train Weight” and the “Weight of the set of carriages” are both entered into the message, the “Traction Weight” can be calculated as the difference of the two elements:

\[ \text{Train Weight} - \text{Weight of the Set of Carriages} \]

If the “Train Weight” and the “Traction Weight” are both entered into the message, the “Weight of the set of carriages” can be calculated as the difference of the two elements:

\[ \text{Train Weight} - \text{Traction Weight} \]

Therefore, as a general rule, at the application level, it will not be required to implement all three elements regarding the weight/length as mandatory elements in the XML. It might be left to the application to calculate one of the three elements – under the precondition that the two remaining elements are entered as mandatory.

12.14.2 Loco Type Number

Currently there is no common coding for the European Loco Type. It can be assumed that each IM is familiar with the Loco Types and its characteristics of its registered
customers (the RUs). Therefore, this element will be based on national basis, defined by each IM: However, this element remains within main structure of the Message as opposed to being in the Network Specific Parameters section – this is because there is likely, at some point in time, to be a European Coding standard. It also serves to keep all traction details together in one section as opposed to splitting the information across the two sections.

In accordance with the specifications of decision 2007/756 (as amended by decision 2012/756), the 12 digits of the element “LocoTypeNumber” are structured as the following composite identifier:

- Digit 1 = TypeCode1, Value 9 as in Part 0 of the Appendix of the decision 2007/756
- Digit 2 = TypeCode2, Type of tractive rolling stock as in Part 8 of the Appendix 6 of the decision 2007/756
- Digits 3-4 = CountryCode, Numerical country code as in Part 4 of the Appendix 6 of the decision 2007/756
- Digits 5-8 = SeriesNumber, 4 digits representing the type according to the country rules and based on the national vehicle register of the country indicated with the CountryCode
- Digits 9-11 = SerialNumber, 3 digits representing the serial number of the traction of the series. Not used in Planning
- Digit 12 = ControlDigit, 1 control digit as usual at the end of the 12-digit UIC identifier. Not used in Planning

First four elements identify the series of the loco, rest can identify the exact individual locomotive.

As there are various models for the ownership and usage of a loco, it is important that the RU which is operating the engine needs to be indicated.

12.14.3 Combined Traffic Load Profile

This element refers to combined load units that can be used for Freight Requests only.

There are two entry options:

- One option refers to “P” (Semi-trailer/road semi-trailer):
  P1 requires the code in case the gauge of the semi-trailer is ≤ 2500 mm. P2 requires the code in case the gauge of the semi-trailer is > 2500 mm ≤ 2600 mm
- The other option refers to “C” (Swap body): C1 requires the code in case the gauge of the swap body is ≤ 2550 mm. C2 requires the code in case the gauge of the swap body is > 2550 mm ≤ 2600 mm

The RUs may indicate the relevant values if they are familiar with the IMs line profiles. In case there is a path request for a train with combined traffic load, the IM should indicate in the Path Details Message the possible max. value for all 4 elements (P1, P2, C1, C2)

12.14.5 Highest planned speed and minimum break weight percentage
Data elements that need to be entered into the Path Details Messages to keep them consistent on their structure referring to IM requirements and information towards the RU. Not to be used in the communication from RA to the IM but only when the IM communicates back to the RA.

12.14.6 Braking weight and Minimum Brake Weight Percentage

27 Approved by Change Control Management
Braking Ratio value is entered by the RA in a Path Request whereas the MinBrakedWeightPercentage value is entered by the IM in the Path Details. Both values are integers 1.999.

From a business perspective these elements must be referred to in terms of a % but have to be entered in the Message as a numeric integer value in the range from 1 up to 999 e.g. 11% will be entered as 11

12.14.7 Use of the Train Activity Type and Associated Trains

The list of Activity Type Codes is split into two types: Common European Codes that are available to be used by all countries and National/Company codes that are only relevant to a specific network and to be used in the RA / IM communication only for that network. In both cases the element size will be 4 alpha numeric.

Common European Codes will have the structure as follows:
- 4 Digit Code (numeric) that represents the Code List values for the common activities

National Codes will have the structure as follows:
- The first two characters will represent the country of the network in ISO format e.g. UK
- The remaining two characters (represented as a numeric) will represent a single unique activity within the network e.g. 01 = Stops shorter than 30 secs

See also chapter 12.9.3

12.14.8 Timing at location

When placing a Path Request the RA enters the following times if the location is a stopping point (e.g. at station): Earliest or Latest or both time(s) for Arrival and/or Departure.

Depending on the agreement between the sender and receiver of the path request messages, when placing a Path Request the RA may enter the times if the location is the “run-through” or leave Arrival and Departure blank.

On the other hand, when preparing the Path Details, the IM always enters the times if the location is a run through: Actual times for Arrival and Departure which must be same. In addition, the IM must use the Activity Type Code for “Run Through”.

When editing Path Details the IM enters the following times if the location is a stopping point (at station): Actual time(s) for Arrival and/or Departure

For the purpose of publication of the timings (e.g. on the stations), the Public location arrival and Public location departure is specified. The public location time may differ from the actual location time. This is relevant only for TAP.
As the child element of the Timing, the BookedLocationDateTime is provided. This element should not be used in the path request (planning) process. It is supposed to be used within the Operations procedures for notification about contracted timetable (daily object Path), when the path object is transformed from planning to operation. The value of the element should correspond to the “Actual Location Departure / Arrival” timing.

12.14.9 Dwell Time

The Dwell Time element is entered in the Path Request to include a required minimum waiting time of the train at a particular location. It is given in the format of a one decimal numeric value whereby the integer part of the value represents the time minutes and the decimal part of the value represents the time in seconds.

The integer value will be represented in minutes only, therefore any dwell time that is in hours (> 60mins) will need to be converted to minutes e.g. 3 hours dwell will need to be represented as 180

The decimal value will be required in all cases (even if there are no additional seconds). Each decimal value represents 6 seconds of time e.g. 0.1 = 6 secs, 0.2 = 12 secs etc...

Any other value will have to be rounded to the nearest 6th second e.g. 16 secs will be rounded to 18 seconds and will be represented as 0.3

For example: A Dwell Time of 12mins & 28 seconds will need to be represented as a value 12.5

And indication of a non-zero dwell time on the first or on the last location of a train may be used to request for a minimum delay before or after another (linked) train, requested or already booked by the RU.

12.14.10 Received on Time

This element is only to be used for the Long-Term planning purposes (for the annual timetable) in order to indicate whether a request has been placed before or after the deadline for placing request for the annual timetable (working timetable). An RA may place a path request either on time (before the second Monday in April of the year before) in order to “benefit” from the procedure as described in EU Dir. 2012/34, Articles 45 and 46 or may place a late path request (after the second Monday in April of the year before). The IM must indicate if the path request was received on time. This is mainly a legal issue.

12.14.11 Status of RU/IM harmonization

These two elements in this group identify the status of the harmonisation Interchange harmonised or Handover harmonised – depending on RA or IM respectively.
Rejected by Change Control Management, included in the sector messages only
If it is the Path Request Message from the RA this status reflects that the RA harmonisation has taken place (full or partial or none) in the element Status of RA Harmonization.

If it is the Path Details Message from the IM this status reflects that the IM harmonisation has taken place (full or partial) in the element Status of IM Harmonization.

Status of Harmonisation (Interchange & Handover) is a Global element – needs to be in all Messages within the Short-Term Path Request processes.

12.14.12 Use of Affected Section

This element group will be applied mainly in case of planning activities related to full or partial path cancellation, alteration or path utilisation notification of a path section to show the part of the train journey that has been impacted (= the affected section).

However, before the implementation of the Train ID the Affected Section shall also be used to identify the train (resp. the request) up to the point that it is being booked. This is for the following messages. Path Confirmed (PC) and Path Details Refused (PDR). The affected section is used to relate to the identification of the train in the earlier message(s) so it has to contain the same Train Number with the valid locations than in the earlier message(s). This is similar to the concept before implementation of Train ID described in chapter 8.

Affected section is defined as the first point of section (start point) and the End point of Section (last point), where start point, and end point appear only once optionally with its BookedLocationTime (planning) or BookedLocationDateTime (operation) in the section to avoid ambiguity. Until the Train ID is implemented, the affected section also includes the Train Number (optional afterwards).

Affected section is also carried in the messages as an array, and therefore serves to indicate which sections are affected as precise as possible. The level of the detail indicated by the array of affected sections can be the same as in the Path Information section of the Path object delivered in the Path Details message.

As the child element of the Timing, the BookedLocationDateTime and/or BookedLocationTime is provided. The first element should be used in operation, the second in planning. BookedLocationDateTime is supposed to be used within the Operations procedures for notification about contracted timetable (daily object Path), when the path object is transformed from planning to operation. The value of the element should correspond to the “Actual Location Departure / Arrival” timing. BookedLocationTime is supposed to used within the Planning procedures to avoid ambiguity in some special cases, like “U-turn” or “Loop” situation (see them below).
Path = A 10:00; B 10:10; C 10:20; D 10:30; E 10:40-10:45; D 10:45; C 10:55; F 11:00

Path = A 10:00; B 10:10; C 10:15; D 10:25; E 10:35; F 10:45; B 10:55; C 11:00; G 11:10
12.14.13 Network Specific Parameters

Network Specific parameters are defined by IM in accordance with national conditions/rules where there is no commonly agreed element that fulfils the same business purpose between the various actors. The use of this shall be limited to the absolute necessary minimum.

For example, the element “Network Specific Parameters” in the Affected Section can be used for RA to IM or IM to RA communication after the path had been booked. The IMs may use it in the “Path Not Available” Message.

For example, a booked path refers to a train length of 620 m. For a specific period, the train length needs to be limited to 400 m. The RA may use this element as agreed with the IM e.g. in the “Path Utilisation Notification” Message to indicate the train length of 400 m for the period the “Path Utilisation Notification” Message refers to.

12.14.14 Contact Detail

The Sender of a message must have a phone number or E-Mail entered or both. Both are shown as optional, but one has to be completed and shown within the message.

12.14.15 Use of the Error Message

Where there is a problem with the Path Request (note: Error Message is not limited only to path request process, it can be used anywhere within the TAF/TAP framework) an “Error Message” has to be used to communicate back to the RA by the IM. This message includes both functional and technical errors connected to the Path Request.

An Error Code is required to be used in the message. There will be an Error code for each element where a problem has been identified. The error code for the element is obtained from the code list and is used to identify an invalid or missing element. In addition, there is a possibility to provide additional text along with the predefined code, known as the Error text. The element can remain as blank, does not need to be completed for each Error Code.

Optionally, additional information can be provided in the MessageSenderReference element about the message that caused the error. The Error Codes have been structured so that it is possible to indicate there is an error with a specific element in the message or within the element group of the message. It can therefore be possible to populate the Error Message with specific errors or errors related to an element group. This will be done at the application level.

In addition, it is possible to enter a textural description of errors within the request message within the FreeText element that is also available. This can be for element

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specific errors but can also be extended to cover logical errors within the request, e.g. where the train locations do not make sense. Again, this will have to be built at the application level.

The code list of Error Codes element is split into two types: Codes for the Common elements in the Message and codes that are only relevant to the elements within the Network Specific Parameters.

Common codes will have the structure as follows:

- 4 Digit Code starting from 5000

Network specific codes will have the structure as follows:

- 4 Digit Code starting from 6000

These will be national Error Codes related to elements entered into the Network Specific Parameters section that have been agreed by RU/IM and held and maintained on the IM system only. These are not required as a common list.

The current Error Code list is given below in the Annex 10.2 “Important codes”.

Note: the elements of the error message, such as error code, type and severity, are packed into one complex element. This complex element, as already indicated in the 12.11.8, is an array (i.e. can be repeated several times within one message). This is done for the purpose, as explained in 12.11.8, to reduce the effort for the communication about the errors, if multiple errors are related to the same error cause.

Note: ErrorMessage has replaced the “AnswerNotPossible” message. The ErrorMessage as such can be used in any TAF/TAP procedure, it is not limited only to the path request related processes.

12.14.16 Type of Request

The “Type of Request” element is needed to indicate which particular business process the RA is applying for. Indication of the request type is necessary for IMs to start the particular business process according to the type (study, or binding path request or modification of the existing contracted object). It is mandatory in Path Request and Path Details, but optional in Receipt Confirmation (as this just provides additional information about the process from which the receipt is required).

Process “Study” is always starting with PathRequestMessage to request for a path study or study program and is ending with the offer of a result with PathDetailsMessage

Process “Request” is starting with PathRequestMessage for the first request for allocation of a path for a train and is ending with the process step “booked” or the refusal of the path offer by RA, or PathDetails ‘no alternative’.

Process “Modification” contains modification, alteration or cancellation of a booked path. The process is starting either with PathRequestMessage or with PathNotAvailableMessage and
is also ending with the process step “booked” or the refusal of the path offer by the RA. In case of a cancellation the process starts with the PathCanceledMessage sent by RA and is ending with PathDetailsMessage “booked” sent by IM.

12.14.17 Type of Information

The “Type of Information” is used in several messages and are used several times for different purposes. Therefore, the recipient has to know the status which indicates why the message was sent. To recognise to which process does this message fit, and also to which particular process step does this particular message have to be considered. It is Mandatory in Path Request, Path Details and Path Utilisation Notification, optional in Receipt Confirmation.

The following values are contained in the TypeOfInformation code list:

1  harmonisation – in process
2  harmonisation – accepted
3  harmonisation – rejected
4  request ready
5  path study request
6  pre-arranged path/reserve capacity
7  create offer
8  coordination update
9  draft offer
10 draft alternative offer
11 observation – in process
12 observation – complete
13 preparation of final offer – in process
14 preparation of final offer – accepted
15 preparation of final offer – rejected
16 final offer
17 final offer – accepted
18 alternative offer accepted
19 pre-accepted offer
21 no alternative available
22 booked
23 preparation of draft alternative offer is in progress

30 Create Dossier
31 Close Dossier

40 Fully Assembled Path (FAP, constructed path)

50 activate path (utilisation notification)
51 deactivate path (utilisation notification)
52 confirmation of utilisation notification
12.15 Application of the Calendar in the Message

12.15.1 Overview of the Calendar

There is a key business requirement to include calendars into all of the STPR Messages that have been defined. The aim of the Calendar is to provide the recipient of the message with the necessary information on the operational status of the train either during the planning stages or after a train has been booked. For example, to include calendar related changes such as cancellation of days run. The Calendar contains

- A validity period of the calendar defined by a start date and end date
- A bitmap defining the running pattern.

The first value in the bitmap corresponds to the start date of the validity period.
The last value in the bitmap corresponds to the end date of the validity period.

The calendar is used for the following business purpose:

During the processes of booking a path:

- **Path Request** – The RA requests a train for a path section the message will contain two calendars in the message. There will be a:
  - Calendar for the whole journey (linked to the TRAIN object in the TRAIN INFORMATION section).
  - Calendar for the path section requested (linked to the PATH REQUEST object and held in the PATH INFORMATION section).

Both of the calendars will include the proposed operational dates/pattern of the train, for the journey and path section respectively. The dates in the calendar are defined by the departure time from:

  - The first location of the whole journey for the TRAIN Calendar (contained in the Train Information section)
  - The first location of the path section for the PATH REQUEST Calendar (contained in the Path Information section). All offsets are calculated from this location as opposed to from the reference location which is included in the TRAIN INFORMATION section of the message.

- **Error (Answer Not Possible)** – If, for whatever reason, the IM is not able to process the path request the message will contain the indication of the logical errors (schedule does not make logical sense) and/or physical message content errors (element in the message is unknown /missing)

- **Path Details** – If the Path Request is processed by the IM who makes an offer back to the RA the message will contain the calendar that is linked to the first location of the Path Information section. It contains

  - the offered operational calendar for the path section that was requested. The RA makes one request with one path section calendar, but the IM could reply offering one or more Path Details message each containing a different
path section calendar that complements the originally requested RA calendar (except if there is a date offset between request and offer. In this case the RequestedCalendar element in the Path Details will complement the originally requested RA calendar).

For example: An RA requests a train service for Mon to Fri in the path section calendar of the Path Request. The IM may offer back two path details messages covering the overall Mon – Fri request with one path details message for the service for Mon to Thu and the other message for the Fri only service.

- Path Confirmed & Path Details Refused – The RA either confirms the IM offer or rejects it the message will contain the path section calendar of the IM from the Path Details Message

After a path has been booked
- Path Cancelled – The RA is able to make a partial or complete cancellation of the booked path the message will contain the calendar that is linked to the first location of the affected section together with the operational dates/pattern the RA wishes to cancel.

- Path Not Available – If the IM has to withdraw an allocated/contracted path (e.g. as a result of a disruption) the message will contain the calendar that is linked to the first location of the affected section together with the operational dates/pattern that the IM has to cancel

Activating/Deactivating a Path
- Path Section Notification with TypeOfInformation for activation and de-activation – For certain networks there is a requirement for the RA to indicate whether a train will run or not against a booked path the message will contain the calendar that is linked to the first location of the affected section together with the operational dates/pattern that have either been activated or deactivated.

Receipt Confirmation
- A calendar will be an optional element in this message which relates to the affected Section. The message will contain the calendar that is linked to the first location of the affected section.

12.15.2 Preconditions for the use of the calendar

The Calendar for Train Information and Path Information are always calculated from the origin of each object (whole journey for Train object, first location of Path for Path Request object) irrespective of Path Planning Reference Location.

The rule for the Offset is always from the Origin Location and offsets in both Train Information and Path Information sections are always calculated from that point forwards. This will result in always a positive offset in all cases.

The Reference Location for planning is still the location for which the RA requests that the planning is made from. It remains unchanged throughout the communication with the
IM and every participant will need to calculate the calendar at the Reference Location based on the calendar at the Origin Location in conjunction the Offset in the Path Request Message. In the case where the Reference Location needs to be changed by the RA then the revised Reference Location needs to be defined.

12.15.3 Calendar used in section related Messages

For all of the messages related to an affected section within a Path the calendar is used linked to the start location of that section.

The affected section can be for the whole path section or part of a section.

Offsets will not be required to be calculated for these messages as no specific locations are identified in these messages – only the start and end of a section are provided in the message.

The messages that are based on the affected section are:
- Path Confirmed
- Path Cancellation
- Path Details Refused
- Path Not Available
- Generic sector message Path Section Notification

12.15.4 Rules related to the Calendar Element

- Both the Start Date and End Date are mandatory elements and must be present with a date that is within the Timetable period.
- Bitmap Days elements is a mandatory element and need to be included along with the Start date.
- The Bitmap Days is a string of values where 1 represents a day that the train will run and 0 represents a day that the train will not run. Each value signifies a day between the Start and End Date.
- Where a specific pattern is needed (e.g. running every Friday) or the train is running more than one day a Bitmap must be included in the message to reflect that pattern.
- If there is a Bitmap days string...
The size of the string for Bitmap days must equal the number of days between Start Date and End Date inclusive and cannot be more or less. If the pattern is different than this will give rise to an error.

- If the Start and End Date are the same
  - Then the Bitmap String will still apply even though the train is only running for one day
- Midnight crossing: The midnight crossings are handled by the Offset element in the PlannedJourneyLocation/TimingAtLocation. If the offset is greater than 0 for the particular location, the legacy systems have to recalculate the bitmap stream accordingly (offset to the reference location). The offset is expressed in days.

### 12.15.5 Using the calendar element

Following examples is for showing the use of the different calendar elements. They are only seen as support for exemplifying for implementation and are not covering all scenarios. Each IM and RA is responsible for correct implementation of these functionalities in their national applications so all situations according to national allocation rules are covered.

#### Train running for one day

- Start Date = 1/1/12 End Date = 1/1/12
- Number of Days the train will run = 1 day
- Bitmap Days = “1”

#### Train running for all days for a period

- Start Date = 1/1/12 End Date = 6/1/12
- Number of Days the train will run = 6 days
- Bitmap Days = “111111”

#### Train running for all days for the rest of the Timetable

- Start Date = 12/11/12 End Date = (8/12/12)
- Number of Days the train will run = 27 days
- Bitmap Days = “111111111111111111111111111”

#### Train running daily except Sundays for the rest of the Timetable

(O denotes the days the train will not run)

- Start Date = 12/11/12 End Date = End of Timetable (8/12/12)
- Number of Days the train will run = 24 days
- Bitmap Days = “111111011111011111011111”
12.15.6 The use of the Calendar for a Path Request
The application of the Calendar can best be described by the following scenario that shows its interaction within the message.

Situation
A path for a train is requested from location A to E passing through two different path sections. The Handover location is at location C which is also the Reference Location in this case. The train travels for 3 days leaving Location A on Day 1 at 11.30, passing across midnight and reaching Location C at 04.30 on Day 2 and then passing across midnight and reaching Location D at 01.30 on Day 3. The train finally reaches its destination Location E at 23.30 on Day 3.

Preconditions
- This is an Open Access Model with one RA and two IMs (IM a, IM b)
- A single train has been requested across a start / end date of 30th July 2012 to 2nd of August 2012
- The train travels across 3 days leaving A on Day 1 at 11.30 and arriving on Day 3 at 23.30 (based on the RA requested timetable)
- The train is offered back with one Path Details Message per IM (IMa and IMb)
- Location times arrival and departure will be treated as the same for request and offer
- The Path Request is correct and contains no logical or physical errors
- All train activities and other preconditions have been ignored in this scenario

Approach
The aim of this approach is to provide efficient RA/IM communication where a train is being requested and offered. In particular this scenario shows how the Calendar and offsets will work together.
Message
RA $> IM a

Path Request Message
RA populates Train / Path Information with proposed Locations / Times
RA populates the two Calendars in Train Information & Path Information
Path Planning Reference Location is Intermediate Location C
Offsets in Train / Path Information are calculated from first Location (Journey / S

<table>
<thead>
<tr>
<th>Path Planning Reference Location</th>
<th>Planned Calendar</th>
<th>Path Information</th>
<th>Planned Calendar</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Start Date 2012/07/30</td>
<td>Start Date 2012/07/30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>End Date 2012/08/02</td>
<td>End Date 2012/08/02</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bitmap Days 1111</td>
<td>Bitmap Days 1111</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Planned Journey Locations</th>
<th>Planned Journey Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Time</td>
</tr>
<tr>
<td>A</td>
<td>11.30</td>
</tr>
<tr>
<td>B</td>
<td>19.00</td>
</tr>
<tr>
<td>C</td>
<td>04.30</td>
</tr>
<tr>
<td>D</td>
<td>01.30</td>
</tr>
<tr>
<td>E</td>
<td>23.30</td>
</tr>
</tbody>
</table>
RA $> IM b

Path Request Message
RA populates Train / Path Information with proposed Locations / Times
RA populates the two Calendars in Train Information & Path Information
Path Planning Reference Location is Intermediate Location C
Offsets in Train / Path Information are calculated from first Location (Journey / S

<table>
<thead>
<tr>
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<tbody>
<tr>
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<td><strong>C</strong></td>
</tr>
<tr>
<td><strong>Planned Calendar</strong></td>
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</tr>
<tr>
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</tr>
<tr>
<td>End Date</td>
<td>2012/08/02</td>
</tr>
<tr>
<td>Bitmap Days</td>
<td>1111</td>
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</table>

<table>
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<th>Planned Journey Locations</th>
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</thead>
<tbody>
<tr>
<td>Location</td>
<td>Time</td>
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<tr>
<td>B</td>
<td>19.00</td>
</tr>
<tr>
<td>C</td>
<td>04.30</td>
</tr>
<tr>
<td>D</td>
<td>01.30</td>
</tr>
<tr>
<td>E</td>
<td>23.30</td>
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</tbody>
</table>

RA Populated
IM a Populated
IM b Populated
Offset calculated
IM a ➔ RA
Path Details Message
IM populates Path Information with offered Locations / Times
Locations / Times and Calendar remain unchanged by the IM
Offsets in Path Information are calculated from first Path Location in the Section

<table>
<thead>
<tr>
<th>Path Information</th>
<th>Original Path Request</th>
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</thead>
<tbody>
<tr>
<td>Planned Calendar</td>
<td></td>
</tr>
<tr>
<td>Start Date</td>
<td>2012/07/30</td>
</tr>
<tr>
<td>End Date</td>
<td>2012/08/02</td>
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<tr>
<td>Bitmap Days</td>
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<tr>
<td>Planned Journey Locations</td>
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<td>Location</td>
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<td>19.00</td>
</tr>
<tr>
<td>C</td>
<td>04.30</td>
</tr>
</tbody>
</table>

RA Populated
IM a Populated
IM b Populated
Offset calculated

IM b ➔ RA
Path Details Message
IM populates Path Information with offered Locations / Times
Locations/Times and Calendar are changed by the IM
Offsets in Path Information are calculated from first Path Location in the Section

<table>
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<td>C</td>
<td>04.30</td>
</tr>
<tr>
<td>D</td>
<td>01.30</td>
</tr>
<tr>
<td>E</td>
<td>23.30</td>
</tr>
</tbody>
</table>

RA Populated
IM a Populated
IM b Populated
Offset calculated

12.15.7 Application of the Calendar in the Affected Section

This element group will be applied only in case of planning activities related to the full or partial path cancellation, alteration or path utilisation notification of a path section.
Affected section is defined by the first location within the path section (start point) and the end point within the path section (end point). The start point, and end point could be all or part of the path section. The Start, End and Bitmap elements are mandatory in the Calendar). The calendar of the Affected Section must be consistent with the calendar that has been offered or allocated in the Path Details message. It will be the one linked to start point of the affected section.

### 12.16 Handling of Handover in Border Sections

This section provides information on how messages will need to be applied for certain situations crossing network borders. A border section is a special section between two IM’s. The problem is the differences between IM responsibilities. Some border sections can have different definitions of where the responsibility lies. This is the:

- **Legal responsibility between IM’s for interoperable traffic**
  The network border is a point where legal responsibility changes between the IMs (this is the handover point). This can but does not have to be in conjunction with a state border.

- **Timetable responsibility between IM’s for interoperable traffic**
  This is the point where there is a change to the timetable responsibility. This can be a mutual border point agreement between the IM’s.

In some cases, the border section can consist of one or more points which are important for both of the IM’s. Those points can have an implication for interoperable or domestic traffic. If more than one IM is involved in the path request and allocation process, the coordination of the border points is needed. For this purpose, the sector recommends using the “sector-only” message Path Coordination.

This can be shown using the following example.

![Diagram of border between two IMs on a state border](image-url)
The Path Information element will contain:

- the timetable responsibility points (intermediate)
- the sections between the origin and timetable responsibility point (if origin is in the network section)
- the sections between the timetable responsibility point and destination point. (if destination is in the network section)
- all the sections need to carry the indication “ResponsibleIM” in order to differentiate which section is operated by which IM. The test cases which reflect various situations where handover, interchange and border points differ are given in the Annex 8.7.1.

The Path Information element will have all mutual agreed points from the border section (especially state border point where is changed legal responsibility between IM’s and often between RA too). This solution solves the problem how to have the necessary information for both IM’s and both RA for every type of border section.

12.17 Usage of Identifiers in Planning Related Messages

The explanation on how to utilize the concept of new identifiers in planning related messages is given in the UML model attached to this Sector Handbook. The following UML diagrams are recommended (in the folder “Business Process Model/Business Use Cases/Planning/Handbook Planning):

- 4.6 Planning
- 4.7 Utilization Notification
- 4.8 Planning Y-Traffic

12.18 Re-planning

After the planning has finished (i.e. after a final offer has been accepted by the RA and PathDetails has been sent with status ‘booked’), the changes are possible in daily business. In order to cover the basic use cases that happen after the planning (and even after the operation phase has started) the following diagrams in the UML model of the concept for the new identifiers are provided (Business Process Model/Business Use Cases/Re-planning/Handbook Re-planning):

- 4.9 Change of Train
- 4.10 Path Alteration
- 4.11 Path Modification
- 4.12 Train Modification

Path Alteration and Path Modification processes do belong to the planning category described in the chapter 12, however, we refer to the diagrams 4.10 and 4.11 here in order to point out how these processes are seen from the aspect of the utilization of the new identifiers.

The diagrams 4.9 and 4.12 contain the basic model for usage of the new messages UpdateLinkMessage and ObjectInfoMessage respectively. These messages are

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31 There is an ongoing activity of the Telematic Expert Groups for handling of the border, interchange and handover points. If the new results will be conducted, the Sector Handbook is going to be updated accordingly.
proposed by the industry in order to keep the information about the relation (link) between the business objects Train and Path up-to-date.
Part C K Operation of Trains
13. Train Preparation

<table>
<thead>
<tr>
<th>TAP TSI only</th>
<th>TAF TSI only</th>
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<tbody>
<tr>
<td>The section hereunder is relevant for TAP TSI only and has no impact on TAF.</td>
<td>This section hereunder is relevant for TAF TSI only and has no impact on TAP.</td>
</tr>
</tbody>
</table>

13.1 Passenger Train Composition

This message is optional, and it is subject to companies’ agreements.

13.1.1 Process for sending information to the IM

Responsible RU sends the train composition message to the IM(s), with which the RU has a path contract for a journey section of the path and if IM contractually requires receiving the passenger train composition message.

This message can be used also, for example, by the RU to fulfil the requirements to inform the IM about the technical information of the passenger train according to § 4.2.2.7 of decision 2012/757 (OPE TSI) if contractually agreed on by IM and RU. Global information related to the train is normally sufficient, but the IM can contractually request information related to the vehicles.

The IM is informed of the planned train composition by the information exchanged during the planning phase. If the IM requests more information, a companies’ agreement describes the additional information and the sending process. An agreement can also concern operation phase (train preparation and train running) to the precise process (timing of sending message: before train starts running, during running, when the composition changes, etc.).

According to network statements or companies’ agreement, this is either required for every train run or only for trains where the planned composition is changed.

13.1.2 Process for sending information to...
the SM

According to the contract, RU sends the passenger train composition message to the relevant SM. This is to inform the SM about relevant technical information and about commercial information of the passenger train that can be used for passenger information.

*Planned information*

According to companies’ agreement, the RU sends to the SM the planned passenger train composition according to a calendar agreed between RU and SM.

*Real time information*

In operation phase, the RU sends the information before the train starts running to the SM managing the station where the train starts. The message is sent also to every other SM involved in this section and every time (triggered at the location) where the composition changes from the planned one.

When the train reverses direction in a station, the RU shall send a new composition message.

The message is sent in due time according to agreements between RU and SM.

Companies’ agreement indicates if the message needs or not to be sent if the train is running according to the planned composition known by the SM.

13.1.3 Process for sending information to the affected RUs

According to companies’ agreement, RU sends the passenger train composition message to the affected RUs, to inform them about the technical and/or commercial information of the passenger train.

no change of composition is expected.

Whenever there is a change in the composition during the journey of a train, the RU responsible has to update this message to all parties involved.
The next RUs inform the relevant IM and SM (see chapter 13.1.1 and 13.1.2).

**Planned information**

The RU sends a message to the affected RUs with the planned passenger train composition. This would be done at a time determined by the calendar agreed between concerned RUs. This is subject to the agreement between the RUs.

**Real time information**

In the operation phase, the RU should send the actual train composition information. This should be done in sufficient time for it to be used by the next RU. This is subject to the agreement between the RUs.

**13.1.4 Content of the message**

The Location and the section for which the transmitted composition is valid for the train run has to be given.

Composition is given for the global train (mainly relevant for IMs and RUs) and/or by unit (mainly relevant for SMs and RUs). A unit can be a coach, a locomotive, a trainset or a vehicle in a trainset.

The message contains elements for technical information (mainly relevant for RUs and IMs) and further elements intended for customer information (mainly relevant for RUs and SMs).

**Technical information**

For the information of the IM and the affected RUs, the technical characteristics having an influence on the train operations have to be given. The following elements have to be transmitted:

- train identification
- location (and section) where composition is
created or changed
- actual length (directly or through vehicles list)

All other information can optionally be transmitted.

Customer information

For the information of the SM and the next RU, the commercial information intended for customer information shall be given. The following elements have to be transmitted:

- train identification
- location (and section) where composition is valid
- complete list of vehicles or trainsets forming the train (by number or by type)
- when seats can be booked, the reservation number of the vehicle
- and the retail service ID (displayed in station and written on the ticket)

All other information can optionally be transmitted. They are related to:

- technical characteristics of vehicles and train
- services offered in the vehicle
- itinerary of vehicle groups if any.

13.2 K RU informs the IM, SM and next RU about restrictions on the rolling stock

The RU must inform the IM of any modification or anomaly to the characteristics of the train affecting its performance or affecting the ability to accommodate the train in its allocated path (§ 4.2.2.7 and § 4.2.3.3.2 of OPE TSI decision 2012/757), e.g. any operational restrictions on a vehicle concerned (gauge, speed restrictions, etc.).

According to agreed rules, the RU could also inform involved RU(s) and/or SM(s) of any modification or anomaly affecting the access
doors, internal fitting and comfort requirement, or in case of non-availability of commercial services that were planned.

In this chapter, the word “restriction” could concern:

a) any modification in the train composition that prevents the train to run according to the allocated path (e.g. addition of a coach with lower maximal speed than the planned speed)

b) any anomaly or defect that implies specific disposition in the train preparation, access to network authorisation, train run

c) any anomaly or defect that decrease heavily the level of services offered to the passengers (e.g. air conditioning failure in summer).

For the restrictions a) and b), the process between RU and IM of information exchange and route continuation/alteration has to be according to network statement. The RU must follow the operational process, if not available the RU has to wait for the feedback of the IM before running the train.

The information about restriction is transmitted prior to departure and during the journey according to agreed rules (which define the timing) from RU to IM and/or from RU to the involved RUs and/or from RU to the SM, depending on the kind of restriction.

The information on restriction is out of TAP obligations. According to agreement between the parties, an optional message (called Rolling Stock Restriction message) can be used to transmit the relevant information. In case the restriction information is included in the Passengers Train Composition message, the Rolling Stock Restriction message is not needed.

Restriction is related to a vehicle. Restriction on train results from restriction to vehicle.

Restrictions were initially coded by a 2. numeric code. The datatype was modified in 2015 to make it more consistent with other
TSI messages. The element is similar to element TrainActivityType, which is contained in messages like PathDetailsMessage. In element TrainActivityType, country-specific codes like CZ01, UK55 and IT72 can be specified. Element RestrictionOrDefectCode also contains these kinds of codes, so it’s logical to apply the TrainActivityType.solution also to the RestrictionOrDefectCode.element. Making it consistent with TrainActivityType will imply that element RestrictionOrDefectCode is defined with datatype xs:string with a restriction of length 4.\(^{32}\)

The optional Rolling Stock Restriction message indicates:
- the identification of the train in which the concerned vehicle is incorporated
- the vehicle number
- the codification of the restriction
- if the restriction is active (case by default) or not (cleared during the journey)
- if relevant the location where the anomaly was detected.

---

**Process triggering the Train Ready message**

The RU has to achieve train departure tasks as described in OPE TSI § 4.2.3.3, namely:
- the RU must define the checks and tests to ensure that any departure is undertaken safely (e.g. doors, load, brakes)
- the RU shall inform the infrastructure manager when a train is ready for access to the network
- the RU must inform the infrastructure manager of any anomaly affecting the train or its operation having possible repercussions on the train's running prior to departure and during the journey.

Only second item is concerned by TAF/TAP Train Preparation process. The RU sends the Train Ready message to the concerned IM.

“Access to the network” means that the train, which was until now managed by the RU for the preparation, is now also managed by the IM. It implies that the IM can open the signal to permit to the train to begin its journey.

\(^{32}\) The reference codes are in preparation and will be added as the annotation (documentation) of the RestrictionOrDefectCode element in the XSD until the end of 2017.
Local rules specify when a “train ready” messages has to be sent.

In practice, a “train ready” message is sent every time a train runs for the first time with its train number. So, the message is sent for example in following cases (unless it is stated that it is not necessary by national rules):

- empty train run from siding to the origin station
- start of the commercial service with passengers on board from the origin station
- empty train run from destination station to siding
- start of the next commercial service performed by the same vehicles that just arrived at the station
- splitting in two trains (Y traffic) for the train which receives a new number.

That excludes for example (unless imposed by the national rules):

- intermediate stops
- intermediate planned composition change without change of train number
- interchange point (between 2 RUs) and handover point (between 2 IMs) without changing of train number.

For case where timetable is train ready message, the signal opens at departure time.

If the train is not ready (or is expected not to be ready), the RU has also to inform the IM. An option is that the RU uses the same message “Train Ready” with a status “Train Non Ready” and if
available, an indication of the expected delay and its reason. This is optional. Also, if the train is expected to be ready at a certain point in time, the message is sent with this forecasted time in “TrainReadyTime”. This is optional as well and has to be mandated by the Network Statement.

If information “train not ready” is sent, then an information “train ready” should follow when the train is ready.

The message “Train Ready or Not Ready” is sent a “short time” before departure. This “short time” depends on national rules described in network statement or in network access contract.

If Train ready information is required at some occasions according to national rules, the same message is used.

The “Train ready” message is mandatory.

<table>
<thead>
<tr>
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<tr>
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</tr>
<tr>
<td>However, if the IM and RU agree not to use the message at given stations and if it is authorised in network statement or track access contract, the RU may inform the IM by using other process or standards than the TAP message, e.g.:</td>
<td>TAF defines TR as a structured message, sent from an information system of RU’s to an information system of IM. Anyhow, with aim to implement TAF in a practical and cost-effective way, also other options should be possible. This is supported by other EU’s legislation, specifically TSI OPE and ERTMS. Therefore it is proposed to consider the following three options, how RU may deliver TR information to IM:</td>
</tr>
<tr>
<td>1. departure on timetable, when the train is ready and departure time is reached</td>
<td>a) TAF TR message will be sent, including the necessary information (mainly Train Identification). It is up to the RU how they collect it and who initiates sending of the message. This way ensures that RU does have the TR data in its own information system.</td>
</tr>
<tr>
<td>2. other technology or means are GSM.R, digital radio, analogical radio, phone near the signal, mobile phone used by crew, button on the platform, etc.</td>
<td>b) GSM.R TR message will be sent, under condition that the train identification is provided in advance or by other means, e.g. when the relation between GSM.R number and the train is established. This has to be mentioned in Network Statement.</td>
</tr>
</tbody>
</table>
Moreover, some IM’s consider (in addition to the above options) also a web tool for collection of TR information e.g. via mobile phone or PDA with http or wap capability. Compliance of such procedure with TAF is not clear, but it may be offered as an additional service to all RU’s. Also, in this option necessary information (mainly Train Identification) would have to be provided.

To inform the IM if the train is not ready, different means can be used.

If train is not ready, expected delay and Delay Cause may be transmitted. In practice, Delay Cause is transmitted by a dedicated message when it is known.

The process graph can be seen in Annex 13.

13.3 Train at Start / Train Position

*These messages are optional and out of TAF regulation*

Depending on contractual agreements Train Position and Train At Start Messages can optionally be used:

For trains created (originated) outside the public network, e.g. private sidings or lines, ports, terminals, IM may send to RU the Train Position Message defining exactly when and where the train should present itself to the network as an answer to the train ready message.

RU may respond on this message by Train At Start Message to indicate that the train has started its journey.

13.4 K Content of the message

To inform IM about “train ready”, train number (OTN) is mandatory.
If train is not ready, expected delay and Delay Cause may be transmitted. In practice, Delay Cause is transmitted by a dedicated message when it is known. ready). In this case the RU gives the planned/estimated time of train readiness. This should be part of the contract or network statement.

If the train starts from a siding yard, optional information is added:
- siding track (to inform the IM which signal must be open)
- destination point (interesting for unplanned trains. trains running without planned path, e.g. short movements between station and siding yard).

All additional information has to be agreed by the correspondent RU/IM.

<table>
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<td>This section hereunder is relevant for TAF TSI only and has no impact on TAP.</td>
</tr>
</tbody>
</table>

13.5 – Information to the Station Manager

Stations Managers are informed of Train Ready according to national rules. The same Train Ready message can be used.

To inform the Station Manager if the train is not ready, different means can be used. The same message above can optionally be used (with status Not Ready).

These messages can be sent in due time under contractual agreement by:
- IM to SM or
- by RU to SM (depending on national railway organisation).

13.6 Identifiers

The utilization of the concept of the new identifiers for train preparation related messages is given in the UML model attached to this Sector Handbook in the folder “Business Process Model/Business Use Cases/Operation/Handbook Operation”. The following diagrams are provided:
- 4.13 Train Composition
- 4.14 Train Ready
12. Train Running Information and Forecast

12.1 K Process triggering the Train Running Information message

The IM has to provide train reporting at appropriate reporting points indicating actual time and the delta-time value (as described in OPE TSI § 4.2.3.4.2.1). This message is sent to the contracted RU to inform RU controllers. It is not used to inform the driver.

The IM sends to the RU a Train Running Information message as soon as the train reaches contractually agreed reporting points (departure from originating station, intermediate arrival, intermediate departure, run through, arrival at final destination). The reporting points must have a scheduled time\(^ {33}\).

Reporting at additional points than the agreed ones can be sent by the IM to the RU.

<table>
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<td>This section hereunder is relevant for TAF TSI only and has no impact on TAP.</td>
</tr>
<tr>
<td>[Not applicable.]</td>
<td>Following the TAF TSI requirements, if the train arrives at the Interchange point and the Interchange between the two RUs is completed, the process of Train Preparation for the second RU has to take place. This is similar in the case of handling of the train at the handling point. If the train is handed over between the IMs, for the first IM the process of train running is finished and for the second IM the process of train running is starting at the beginning, therefore with sending the first train running information and all relevant forecasts for its network.</td>
</tr>
</tbody>
</table>

The time limit to send the message after the train has reached the reporting point is defined by national rules or contractual agreement. In practice, the sending is done in “real time” in case of electronic tracking and tracing systems, the time limit has to be agreed in case of manual input in the IT system.

Delay Cause is sent by a specific message (see chapter 18).

The process graph can be seen in Annex 13.

\(^ {33}\) In the exceptional case of ad hoc re-routing, the (new) scheduled time might not be known.
12.2 K Process triggering the Train Running Forecast message

<table>
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</table>

The IM has to provide train forecast at appropriate forecast points (as described in OPE TSI § 4.2.3.4.2.2). This message is sent to the RU to inform RU controllers. It is not used to inform the driver.

The IM sends to the RU a Train Running Forecast message as soon as the train reaches contractually agreed reporting points to deliver a forecast time at an agreed forecast point. This implies that the forecast time can be defined. If not, a Train Running Interrupted Message is sent.

Forecasts points are agreed by RUs and IMs and are usually stations and handover points. Reporting points (triggering Train Running Forecast message) can be origin station, handover point from previous IM, interchange point between 2 RUs, points between stations and other agreed points. These reporting points can be different from the reporting points triggering Train Running Information message. The reporting points have usually a scheduled time, the forecast points must have a scheduled time.

The message can also be sent before the train starts running

It is also sent before train reaches the next reporting point if the forecast delay (increasing or decreasing) varies more than an agreed threshold. This threshold has to be agreed with the actors (current IM, RU and next IM). It could be different from freight trains and also according to passengers trains types (local, regional, high-speed, long-distance).

Sending the train running forecasts

After the departure of the train from the origin station, or after taking over the train from the previous IM at the handover point, the IM in charge sends the Train running forecast for the handover point to the next IM and all relevant forecasts (for the handover, all interchange, handling and reporting points relevant for forecast) on its network to RU who has booked the path on which the train is actually running (named “contracted RU”). In addition, these forecasts could be sent before the planned departure of the train from the origin station or from handover point if such information is available to the IM and IM has a process in place to do it. In the case of ETI (Estimated Time of Interchange), the RU transfers this message to the next RU and additionally to the Lead RU (LRU) for the transport – if there is one and if this is defined in the cooperation contract between RUs. In the case of ETH (Estimated Time of Handover), the IM receiving the forecast for the handover point from the previous IM may take this forecast as a basis for calculating the forecasts for its own network.
The message is also sent by the IM to the next IM involved in the train run (forecast point is generally the handover point), details of sending conditions are defined in a bilateral agreement.

The forecast time is also sent to the Station Manager in due time i.e. which permits to undertake all stations operations (voice announcements, information display on screens, etc. as agreed between SM and RU and/or IM) before the train arrives in or passes through the station. The message is delivered either from IM to SM, or from IM to RU to SM, under a contractual agreement according to the national railway organisation.

The time limit to send the forecast message after the train has reached the reporting point is defined by national rules or contractual agreement ("in due time" according to TAP TSI). With electronic or IT devices in the tracks or in signaling boxes, the calculation and the sending is usually done in “real time”. The “due time” has to be defined in case of manual input in the IT system.

The method to calculate the forecast time is defined by each IM. The process graph can be seen in Annex 13.

<table>
<thead>
<tr>
<th>12.3 – Information to the Station Manager</th>
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<tbody>
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<td><strong>TAP TSI only</strong></td>
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<tr>
<td>The section hereunder is relevant for TAP TSI only and has no impact on TAF.</td>
</tr>
<tr>
<td>The Station Manager receives Train Running Forecast messages and Delay Cause messages (see chapter 18).</td>
</tr>
</tbody>
</table>
These messages are sent in due time under contractual agreement by:

- IM to SM or
- by IM to RU and then RU to SM (depending on national railway organisation) according to contractual agreement. The RU may change the value of the message before passing the message on to the SM.

12.4 K Content of the messages

The actual time (element LocationDateTime) is mandatory in Train Running Information.

The forecasted time (element LocationDateTime) is mandatory in Train Running Forecast.

For both messages:

The planned time of a train at the reporting point can be specified in

- BookedLocationDateTime : this is the last agreed (booked) time at this location, also after a re-planning
- ReferencedLocationDateTime: this is the originally (and internationally agreed/published) time.

If no re-planning has taken place, both elements contain the same time.

If the delay (actual/forecasted) is given in the TrainDelay section, the element AgainstBooked has to be used to indicate the delay according to the (last) booked timing. The AgainstReferenced can be used to indicate the delay to the originally planned timing.

<table>
<thead>
<tr>
<th>In addition, other existing standards may be used for the same purpose (i.e. the information provision) if there is a specific agreement between the parties involved to allow the use of these standards.</th>
<th>The sequence made up from the elements “EnquiryReference” and “Date” are optional and out of TAF regulation. These messages are also issued as a response to the Enquiry Train Running Forecast /Information Message (message optional and out of TAF regulation).</th>
</tr>
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12.5 Identifiers
The diagrams related to the train information during the operation phase are provided in the UML model for the concept of the new identifiers in the folder “Business Process Model/Business Use Cases/Operation/Handbook Operation”. The following diagrams are provided:
- 4.16.2 Train Running Information
- 4.17.2 Train Running Forecast
13. Service Disruption/Train Running Interrupted

13.1 – Process triggering the message

Events leading to Service Disruption can be caused by external events (e.g. obstacle on tracks), IMs (e.g. CCS breakdown), RUs (e.g. locomotive breakdown).

If the train is stopped due to the disruption and no forecast of its further run is yet available, the Train Running Interrupted messages must be sent from IM to RU.

The meaning of “disruption” is understood nationally. Some events are clearly disruptions, as derailment, catenary galling, tracks under flood, etc. Others are more complex to classify, as locomotive or signal breakdown.

According to the national IM rules, each IM may apply a different threshold beyond which the Train Running Interrupted message must be sent. These thresholds must be agreed in a contract between IM and RU.

Train Running Interrupted messages serve to inform the RU that its train run has been interrupted and a forecast for its further run is not yet possible. The message is the trigger to inform the RU (and the next IM if relevant) and to agree on a solution on how to solve the problem.

The Train Running Interrupted message is sent by the IM to concerned RUs, to the next IM if relevant, and to the Station Managers (either directly or through the RU according to national organisation) for every train that is interrupted.

When RU is responsible and doesn’t know how long the repair will take, it has to inform the IM of this service disruption (according to § 4.2.3.3.2 of OPE TSI) by the best way and means (radio, phone, local IT messages, etc.). RU could use the same Train Running Interrupted message (this agreement is out of TAP obligations).

After the problem is analysed, decisions by RU after IM consultation can be (not exhaustive):

1. Delaying the train – the train will wait until disruption has been solved and then will continue as originally planned but with a delay. The accepted value of the delay depends on the negotiation between IM, RU and the next IM and on the situation at the national level. If this solution is taken, the updated Train Running Forecast messages are sent, and the process of Train Running continues.

2. Cancellation of train run by RU – due to the disruption, the RU may decide to cancel the train run as it is. In this case, the process of train running for this train has ended and no further train running or train running interruption messages will be sent.
3. Rerouting of train – train will be rerouted, which may lead to the cancellation of the whole or just part of the original path. The relevant processes (path alteration, path cancellation or new path negotiation) might follow.

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If the time for the path alteration/cancellation/new negotiation is missing, the train journey modification can be applied. See chapter 17.

The process graph can be seen in Annex 13.

15.2 – Information to the Station Manager

Station Manager could be informed using national procedures.

Train Running Interrupted message (chapter 14) and Delay Cause message (chapter 18) can also be used according to agreement.

These messages are sent in due time under contractual agreement by:

- either IM to SM
- or IM to RU and then RU to SM (depending on national railway organisation) according to contractual agreement. The RU may change the value of the message before passing the message on to the SM.

15.3 – Information storage

To fulfil passenger’s rights regulation, TAP TSI requests to store service disruption data for 12 months.

As service disruption means only that the forecast cannot be sent immediately, the utility is limited as the train running information and forecast can nevertheless be sent later.

To fulfil the passenger’s rights regulation, the requirement for data to be stored should therefore be understood for Train Running Information instead.

It has to be compliant with the requirements of European Performance Regime process.
15.4 – Content of the message

The Location where the interruption occurs has to be given. If the train is stopped at a location not existing in the reference file, the next location from the reference file has to be given.

For the exact specification of the location the option element Detailed Description of Location can be used (free text).

In addition, the cause of interruption and the estimated duration (earliest and/or latest estimated end time) can optionally be stated. At the very moment of sending the message the possible cause doesn’t have to be yet identified. However, whenever possible the delay cause coding should be used.

The Internal Reference Identifier can optionally be used to specify the IMs internal system reference (e.g. incident number). The Internal Reference Number refers to a propriety identification used by an IM to reference a specific event. For example, the IM might give an incident number to a signal failure and refers to that signal failure for delay communication. The Internal Reference Number is not specified on European level.

The Train Running Interrupted message will be treated only as a message to inform about the interruption of a single train run.

<table>
<thead>
<tr>
<th>In addition, other existing standards may be used for the same purpose (i.e. the information provision) if there is a specific agreement between the parties involved to allow the use of these standards.</th>
<th>However, it is possible for a single IM to adapt the message to be used also for multiple trains. But this is left to a decision of a single IM and is not being harmonised or regulated at the TAF TSI level.</th>
</tr>
</thead>
<tbody>
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15.5 Identifiers

The diagrams related to the train information during the operation phase are provided in the UML model for the concept of the new identifiers in the folder “Business Process Model/Business Use Cases/Operation/Handbook Operation”. The following diagrams are provided:

- 4.20 Train Running Interrupted
16. Change of Track/Platform

This information is needed to enable the Station Manager to fulfil passenger information requirements according to TAP BP 4.2.12. The SM shall inform the passenger about changes of track (or platform) for train services. The information needs to be delivered to the SM.

16.1 – Process triggering the message

In case a train service shall not arrive or depart on the originally planned track/platform, the IM has to inform the RU and the SM (directly or via the RU) in due time before the arrival of a train (or before the departure at origin) for passengers information in station.

Beside local agreement, the following message (out of TAP TSI scope) can also be optionally used.

This message concerns the relevant information for passengers in stations, where to board a train. According to local circumstances, this is a track in platform (track adjacent to a platform) or a platform itself[^34]. It does not cover the information on any other tracks on route of the running train.

The message is sent in due time under contractual agreement by:
- either IM to SM and RU
- or IM to RU and then RU to SM (depending on national railway organisation).

The process graph can be seen in Annex 13.

16.2 K Content of the message

The message shall indicate the new track/platform, where the train service is foreseen to stop. Track or platform is usually defined by a subsidiary location code (with subsidiary type code respectively 01 and 15).

[^34]: The meaning of track can be understood differently. In this context, track means the location where a passenger can board a train.
Difference between technical track and public track should be noted: The unique reference of the platform edge is mandatory. National rules have to identify unambiguous if the public name or the technical name of a track in platform is used.

In case local or national agreements require only the IM to inform the SM always, proprietary messages can be used as this is a fixed relationship.
17. Train Journey Modified

This information is needed to enable the Station Manager and the Railway Undertaking to fulfil passenger information requirements according to TAP BP 4.2.12 and 4.2.13. The SM and the RU shall inform the passenger about deviations from plan. The information needs to be delivered to the SM and/or RU. The same message can be used to inform the next IM if relevant: whole train cancellation, rerouting, retiming at handover point, etc.

17.1 Requirements on messaging

According to BP 4.2.12 RUs and/or IMs have to provide real time information on the train run to the SM and according to BP 4.2.13 RUs have to provide real time information on the train run to the passengers inside the train. For Material delays, the Train Running Forecast Message and the Delay Cause Message are appropriate.

For full or partial cancellation and Train re-routing, messages from Short Term Path Request (path alteration process) cover similar content. However, the process of creating a new path is outside the operational control and would be inappropriate for real-time information as quoted in BP 4.2.17 (“This BP does not include Traffic Management issues. The time limit between Short Term paths and Traffic Management path changes is subject to Local Agreements.”).

Beside local agreement, a Train Journey Modified message (out of TAP TSI scope) can also be optionally used.

17.2 – Process triggering Journey Modified message

In case a train service cannot use its planned path and serve its planned stopping pattern, RU and IM have to decide on the continuation of the train (this could start after the IM has issued a Train Running Interrupted message). The following possibilities can occur:

- The whole train service is cancelled completely
- The train service is partly cancelled (could be at the beginning, the end or between intermediate points of the train journey).
- One or more single stops are cancelled.
- One or more single stops are added.
- The train is rerouted. Rerouting can be understood as a combination of stop cancellation and stops added.

If these solutions are envisaged for future train runs, these shall be handled within the Short-Term Path Request. For operations (non. future, the train is running or, according to national rules, prepared and/or foreseen to run) the Short-Term Path Request processes may be too slow to provide the information in real time.

Specific messages are foreseen and can be optionally used according to contractual agreement. These messages have only informational character and do not substitute the formal process of train journey modification.

If not otherwise specified in national rules, there is no need to update the (short term) planning IT system with the modified journey.

These messages do not automatically change the path contract.

The operational messages on journey modified are sent once IM and RU (and SM if relevant) have agreed (manually or using standards outside TAP TSI) on the continuation of the train. They can be sent from

- RU to SM
- IM to SM
- IM to RU (and either RU to SM)

The information in these messages is used for customer information.

### 17.3 Change of Train Number (OTN)

In case the modification of the train journey requires a change of the train number (OTN), the IM has to inform the RU about the new OTN. This can be done using manual processes and manual input into the individual systems of IM, RU and SM would then be needed.

Process may change when TRID is implemented.

### 17.4 Content of the Message

IM or RU informs the SM and/or the contracted RU on the modified journey.

The journey modified message serves the different scenarios.

- Whole Train Cancellation:
  The indication “Whole train cancellation” is given. The first and
the last location of the (foreseen and now cancelled) train service is given.

- **Partial Train Cancellation:**
  The indication “Partial train cancellation” is given. The first and the last planned location that are no longer served by this train service are given. All stations in between, including the given first and last planned location, are not served by this train anymore.
  In case this partial train cancellation is given between intermediate stations, it is understood that there is no through train anymore.

- **Station Stop Cancellation:**
  The indication “Station Stop Cancellation” is given. Only the given location (1 to many) is cancelled. The train continues to serve all other planned stations.

- **Additional Station Stop:**
  The indication “Additional Station Stop” is given. All the given locations (1 to many) are added to the original train. All other planned stops are served as planned.

- **Rerouting:**
  The indication “Rerouting” is given. Every single station stop that is no more served has to be given with the “station stop cancellation” status. Every single new station stop that is added due to rerouting has to be given with the “additional station stop” status.
  Rerouting is in fact a mixture of “Station Stop Cancellation” and “Additional Station Stop”.

- **Retiming**
  A station stop can receive a new timing, following the train modification. The elements Scheduled Time at Location and Train Location Status have to be filled then.

One message can include a mixture of these scenarios. Therefore, the Train Journey Modification is 1 to many.

In case local or national agreements require only the IM to inform the SM always, proprietary messages can be used as this is a fixed relationship.
18. Train Delay Cause

This chapter applies when IM has to inform the RU (and if relevant next IM) of the reason of a delay, this delay could appear during normal running, service disruption, rerouting, journey modification, etc. (see in particular chapters 14 and 15).

18.1 K IM informs the RU on the delay cause

The IM has the responsibility to find when possible the cause of a delay, according to national rules, and to enter the code of the Delay Cause into the IT system.

The dedicated Delay Cause message is issued by the IM to the contracted RU as reasonably possible to make known the cause of an additional delay in a train's journey.

The acknowledgement of the Delay Cause is made by internal process. Dispute process is described by national rules.

Unless otherwise agreed, the Delay Cause message has not to be sent to the next IM (the forecast message at handover point is sufficient).

Under agreement, the Delay Cause can be sent from a RU to the partner RU(s).

<table>
<thead>
<tr>
<th>TAP TSI only</th>
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<tbody>
<tr>
<td>The section hereunder is relevant for TAP TSI only and has no impact on TAF.</td>
</tr>
</tbody>
</table>

If the RU wants to inform the passengers in stations of the reason of a delay, the Delay Cause message can be used. The message is delivered to the Station Manager under a contractual agreement by the IM or the RU according to the national railway organisation. It is delivered in due time i.e. which permits to undertake the announcements (voice, screen, etc.) before the train arrives in the station.

Main rules concerning Delay Cause message are:

- every delay (incl. every additional delay35) should be reported, not only those happening at reporting points

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35 Additional delay – occurs, when the new delay event appears. It is the first delay and every increase of the delay during the train run. Examples:

- a) train was on time in previous point and now is delayed for 5 minutes: additional delay is 5 minutes
- b) train had 5 minutes delay and now is delayed for 7 minutes: additional delay is 2 minutes
- c) train was 10 minutes in advance and now is only 5 minutes in advance: no additional delay
- d) train was 5 minutes in advance and now is 3 minutes delayed: additional delay is 3 minutes.
• if a delay occurs at points not included in reference file, it will be shifted to the next reference file point
• Delay Cause message should be sent at the moment when the code for a delay is specified (according to UIC leaflet 450.2)\textsuperscript{36} and always when the code is changed
  o one message is sent for each Delay Cause.
• in case the reason of the delay is changed (but the delay duration stays the same), the updated message with the new Delay Cause code and status alteration will be sent,
• in case the original delay time is changed (e.g. split of delay into more causes) the deletion of the original messages must be sent and new messages with the new codes must be sent

It is out of the scope of the TAF and TAP TSI to define the detailed rules for coding or validating the delay causes, or to specify any threshold values for coding of delays. The threshold for coding the additional delay is depending on the national law or internal IM rules. The only requirement is that whenever the code for the delay is defined or changed, the Delay Cause message should be sent to the contracted RU.

<table>
<thead>
<tr>
<th>TAP TSI only</th>
<th>TAF TSI only</th>
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<tbody>
<tr>
<td>The section hereunder is relevant for TAP TSI only and has no impact on TAF.</td>
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</tr>
</tbody>
</table>

18.2 **K RU informs the IM on the Delay Cause**

In case the RU wants to inform the IM, it can use the same Delay Cause message from RU to IM according to agreement.

(This agreement is outside the obligations described in TAP TSI).

18.3 **Information to the Station Manager**

Delay Cause message is sent in due time under contractual agreement by:

- IM to SM or
- by IM to RU and then RU to SM (depending on national railway organisation). The RU may change the value of the message before passing the message on to the SM.

The process graph can be seen in Annex 13.

\textsuperscript{36} Excluding unspecified default codes (like „00“)
18.5 Content of the message

The DelayLocation where the delay occurs has to be given. If the train is stopped at a location not existing in the reference file, the next location from the reference file has to be given.

In addition, the time, when the delay occurred (DelayEventDateTime), the amount of the delay (DelayTime) and the cause of delay (DelayCause) have to be stated. The delay cause coding has to be used.

The Internal Reference Identifier can optionally be used to specify the IMs internal system reference (e.g. incident number). DelayCodingDateTime can optionally be used as a time stamp when the coding was done. This can serve to create a history of coding.

18.6 Identifiers

The diagrams related to the train information during the operation phase are provided in the UML model for the concept of the new identifiers in the folder “Business Process Model/Business Use Cases/Operation/Handbook Operation”. The following diagrams are provided:

- 4.21 Train Delay Cause

Additionally, the following diagrams can also be used since they cover some use cases from the daily business:

- 4.18.2 Train Delay Performance
- 4.19.2 Train Forecast at Reporting Location
19. Passengers information in station area and vehicle area

**TAP TSI only**

The section hereunder is relevant for TAP TSI only and has no impact on TAF.

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Information has to be provided by displays or voice announcements in stations at which trains performing international service stop and within the vehicle area of trains performing international service. That concerns planned information and also real-time information in case of deviation of the plan. This chapter shows which chapters need to be consulted to get the real time information.

**19.1 – Passengers information in station area**

The Station Manager has the responsibility to inform the passengers with train running information within the station via voice announcements and/or display.

This applies at least in respect of stations at which trains performing international services stop.

Information described in TAP TSI § 4.2 is provided to Station Managers by IM and/or RU according to contractual agreement.

Real time information is provided according to messages described in sections 12 to 18. Other information is provided under contractual agreement (means, rules, process, etc.)

**19.2 – Passengers information in vehicle area**

The RU has the responsibility to inform the passengers with train running information within the vehicle area via voice announcements and/or display systems. This applies at least to all trains performing international services.

Information described in TAP TSI § 4.2 is under RU responsibility or is provided by IM to RU according to contractual agreement.

Real time information is provided by IM to RU according to messages described in sections 12 to 18. Other information is provided under contractual agreement (means, rules, process, etc.)
Part D K Overall requirements
20. **General remarks**

This chapter provides information on general requirements, further explanations and information to be taken into account when implementing the RU/IM Message exchange.

Use of new identifiers and their combination with the existing legacy identifiers is explained in chapter 8 and additionally referenced through the chapters 12, 15, 16 and 18.

For the full concept of the new identifiers the following attached documents and references are provided (see list of Annexes for Chapter 8 – Annex_8.x):

- UML Model of the concept for the new identifiers
- Update Link Framework
- UpdateLinkMessage
- ObjectInfoMessage

Baseline document used for the initial content of this Sector Handbook: WG10 Identifiers Handbook, endorsed by the industry after TAF Phase 1 in November 2011.

20.1 **Use of common elements in the messages**

**Free text field**

Normally local language is to be used but in bilateral agreements a different rule could be agreed upon.

**Message reference**

In case of alteration or deletion of the message the reference to the original message should be made via the functional data as a key (e.g. Train Ident, Location Ident).

20.2 **Mandatory or Optional Elements in the Messages**

Within the message structure, there are number of elements that are either mandatory or optional.

- Mandatory elements have to be in the message content for all message exchange.
- Optional fields only need to be filled in where there is a need to have them between RU/IM or where network regulations may well dictate or where there is mutual agreement to do so.

Optional status may well apply to individual elements or groups of elements (e.g. the use of ON DEMAND path element may only be relevant to the RU and IMs in certain networks).
Optional elements may also apply to groups of elements where the entire group may be either needed or not needed.

Where a message element is identified as ‘optional’, this may be changed by the IM who may declare it as mandatory according to the requirements in their Network Statement for their path section. It will be mandatory for interoperable/international trains where there is a requirement to use an element as per their national regulation or bilateral agreement between RU and IM. This will mean that all validation rules of the element(s) will be applied as per normal.

If there is no Network Statement demand for the optional parameter or no bilateral agreement between RU and IM underpinning that, no one can force the partner (RU and/or IM) to use the particular parameter as mandatory.

In addition, some elements and sub-elements are conditional. That means, they are optional in a technical sense, but if there is a specific business need or purpose – based on IMs requirement published in the Network Statement – some or all of the (sub.) element will be mandatory.

There are also a number of elements that are either mandatory or optional depending on whether they are for freight or passenger traffic.

Several message elements are global, that means they are used for communication purposes in several processes (e.g. for planning and operations). E.g. some message elements used in the ‘Short-term path request’ have to be optional from the technical point of view because they are optionally in operations but must be mandatory when they are applied for planning and vice-versa.

20.3 Message exchange partners

Messages are exchanged between parties having a business relation with each other. That means that a message exchange is between the

- IM and the RU that wants to or already has booked a path with this IM
- IM and the neighbouring IM involved in the train panning or operation
- IM and/or RU and the SM involved in the operation of the train
- RU and any partner RU involved in the train planning or operation (this possibility is on bilateral agreement outside TAF and TAP obligations).

For example, for a train running on two IMs and operated by two RUs (one per IM) the information flow can be

- IM 1 to IM 2 and then IM 2 to RU 2; or
- IM 1 to RU 1 and RU1 to RU 2

depending on the agreement.
Note on Network specific or national specific parameters

The agreement of the sector is that no new national specific elements in the Common metadata should be introduced.

- All national specific elements should be defined in the Shared metadata
- When building the shared metadata, the common metadata can be included
- Any message from Common metadata can be adapted in the shared metadata according to the BILATERAL / Multilateral agreement

Rules

- Shared metadata must contain the TAF/TSI Header with the message type
- If the message with additional national parameters is an extension of the message from Common metadata, the Message Type has to be different from the one from the Common metadata

20.4 Masterplan

Each individual actor has submitted its own implementation masterplan for TAF and TAP.

These masterplans were consolidated in two European-wide documents, respectively 20130117_TAF.TSI.Master.Plan.pdf and 20130428_TAP Master Plan Delivery_final.pdf available on JSG website.

The target dates contained in the consolidated masterplans are:

- Recommended for actors having delivered their masterplan (delivered dates remain mandatory)
- Mandatory for actors having not delivered a masterplan.

The reporting process is described in the governance document TAF_org 2014 20130829 V8.pdf.
21. Data quality

In order to efficiently use the RU/IM message exchange and the related applications good data quality is essential. Data quality requirements are shown in the following picture:

Generic data quality requirements

- **Completeness**
  - All necessary data is stored in the databases
  - All messages sent are received

- **Conformity**
  - The right standard is used

- **Correctness**
  - The right data is used (esp. related to reference data)

- **Actuality**
  - Data is up to date

- **No redundancy**
  - Databases have no redundant data.

- **Timeliness**
  - Messages arrive in time

The following general rules to reach a high data quality in the RU/IM message exchange apply:

- Data quality is the responsibility of the sender.
  - Before having been sent messages must be checked by the sender in order to ensure that it is well-formed, complete and valid (against the message/elements as defined in the message catalogue).
- Data quality (can and) will be measured by the receiver of the message.
- The receiver talks to sender in case the data quality needs to be increased.
- Messages sent shall be secured by signing, encrypting and compressing the message:
  - All IMs and RUs involved in the communication shall have the certificate from the Certification Authority to use encryption and signing certificate.
  - Encryption (using SSL/TLS) shall be provided assuring privacy and authentication of the sender and avoid man in the middle attacks.
  - Signing shall be used to assure integrity of messages.

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37 It is up to the involved parties to decide whether every message (type) needs to be signed and encrypted besides the secure transport.
Two actors keeping a communication should have the certificate generated with same Root certificate to work with encryption functionality and a security alias of the certificate should be provided.

The following possibilities are supported by the RU/IM architecture to detect and increase data quality:

- Syntactically incorrect messages are placed in temporary storage for analysis and reporting (Dead letter queues. storage of message that could not be delivered in a Common Interface or on application level). This would indicate problems in format data quality.
- In case a message is not delivered (no acknowledgment by the CI) the message can still be found in sending queues. – It is up to the sender to check the delivery.
- The Error message can be used to report and measure semantic data quality (content level). The Error message is sent from the receiver of an earlier message to the sender of that earlier message. The message is used when the information in the original message was not good enough to create an answer. The message supports a list of elements that have errors or could also be business related errors (e.g. a schedule is not logical). The level of detail of this Error message will depend on the application that emits this message. It should be as detailed as feasible with the legacy system with the minimum information: Message was not usable. Detailed information, if supported by legacy system, shall use a subset or all of the common error codes described for the Error message.
- In case of the same message with the same content (e.g. train running message for train X at location Y sent several times), rules like “Last message wins”, relying on the MessageHeader time stamp, would avoid the handling of ambiguous message information. This has to be implemented at application level.
- For the central reference database, specific Entities are responsible for the storage of specific codes (e.g. national entity for primary codes in its country). This Entity has to makes sure, that one location is coded once – avoiding ambiguous codes like 10 different primary codes for the same physical station (for example only). See also chapter 9.6 for quality requirements on reference data.
- Timeliness of message exchange can be checked on application level, e.g. comparing the actual timing of a train run and the timestamp of the message arriving. It depends on contractual agreements.
22. Functional Governance

This chapter provides information about contact and processes for receiving the certification for the RU/IM message exchange and for functional changes. This includes ways to request code values and also ways to request changes in the message structure.

22.1 Code allocation

Codes are divided into three categories:

- **A** for functional codes that have no impact on the message exchange. It represents functional information that is sent through the messages for functional use within the business processes (e.g. planning of a short-term train).
- **B** for process codes that have a relevance for the way applications deal with the message (e.g. the status of the message new, update, delete).
- **C** for external codes that are used within the business processes but are controlled by different domains (e.g. Retail, UN Codes) that have their own governance processes. A reference to the controlling body is given.
- **D** for codes used only in messages out of the scope of TAF and TAP.

Processes for the maintenance of codes

- Category A and Category B
  Any involved actor (e.g. RU, IM, AB, SM) can put the request for a change (new, alteration, deletion) to the JSG/SMO. The entity can consult relevant expert working groups on the need of that change. The proposal is submitted to ERA CCM process (described in document \textit{ERA_Telematics_CCM_Guide_V1_3_r11_092013.docx}). If relevant, a migration strategy has to be developed as well.

- Category C.
  > see respective controlling body. The entity publishes these codes as well for information as soon as they are known. A delay notice until the use of these codes can be agreed.

- Category D
  Any involved actor (e.g. RU, IM, AB, SM) can put the request for a change (new, alteration, deletion) to the JSG/SMO. The entity can consult relevant expert working groups on the need of that change. The proposal is agreed according to the sector internal governance (tbd). If approved, a migration strategy has to be developed as well.

22.2 Change of messages and/or the structure of the reference file

Any involved actor (RU, IM, AB, SM) can put the request for a change (new, alteration, deletion of a message) to the \textless sector RU/IM governance entity\textgreater. The entity can consult relevant expert working groups on the need of that change. The working group can reject, ask for clarifications and give recommendations, eventually following an impact analysis within a given timeframe. If approved, a migration strategy has to be developed as well.
The proposal is submitted to ERA CCM process (described in document ERA_Telematics_CCM_Guide_V1_3_r11\09\2013.docx). If relevant, a migration strategy has to be developed as well.

Change of message can only be once per year on a given date. Migration plan needs to allow companies to implement it (communication of change at least 1 year before usage).

A migration plan should be proposed by the WG, including a minimum period in which the change is optional and a time from which the change is mandatory.

The WG of the TAF and TAP governance entity should take into account both business and IT needs.

### 22.3 Allocation of certificates for messages

Every participant in the RU/IM message exchange will have to use valid (X509) certificates for secure communication and if needed for message encryption and signature. These certificates are issued under the authority of the governance entity.

Every company has to register once to central admin (currently this is the admin of CCG). The governance admin service will verify the user and will subsequently grant access to a secured website where certificate can be downloaded.

The Expiry dates of the certificate are mentioned in the certificate. The company has to make sure to get a new certificate before.

### 22.4 Access to reference data

Every actor in the RU/IM message exchange needs to register for the message exchange (see 23.3 on allocation of certificates) through the governance admin service. Following certification, the actor has access to all location codes stored in the Central Repository File Database. The reference data can be used for all TAP and TAF purposes and related processes. To perform these processes, actors may give the data to suppliers under the precondition that the actor ensures the data is solely used for these purposes and is not used for other commercial activities.

Access to all reference data will be provided through the use of a reference data service managed by the governance entity. This service will meet the requirements described in this Implementation Guide or as subsequently decided by the governance entity. Access requirements are not subject to approval by the TAP.CCM or TAF.CCM.
23. Glossary

See Annex 20.
24. List of Appendices

Messages

- **Annex 1 – Message Catalogue** (target TAP TD B.30 and TAF Annex D.2, Appendix F)

The XSD is stored by the sector in [https://github.com/smagla/sector_xsd](https://github.com/smagla/sector_xsd)

The XSD is organized as follows:

- **taf_cat_complete_sector.xsd**: One merged schema with comments to differentiate the "sector" messages and elements from the official (ERA) common metadata. This schema contains both sector as well as the ERA (TAF/TAP mandatory) messages. Namespace for the sector is provided, to differentiate from the official schema since it contains sector messages and elements. Sector baseline will always be made after ERA publishes the official baseline. Version identifier of ERA contains two digits (e.g. 2.1). The version identifier of the sector contains 3 digits: 2.1.1. The third number is incremented on any change in the schema except annotations (textual descriptions of the elements).

- **taf_cat_codelist_sector.xsd**: all codelists used in the main schema.

The Messages are in xsd. Note that rtf/document formats should only be looked at by xml/message experts and it is not recommended to be printed for all others. It is anyhow recommended to look at the specific messages in an xml.editor/viewer.

The both schemas ("complete" and "codelist") are provided as MS Word documents (exported from the XML processing tool) in the Annex 6.2 and Annex 6.3 respectively. The explanation of the XSD model graphic representation is given in the Annex 6.1

Annexes to Part A

- **TrainID – OTN Framework (Annex 8.1)**
  This framework document explains the relationship between new TAF/TAP identifiers and Operational Train Number (OTN).

- **TrainID – Variant Framework (Annex 8.2)**
  This framework document contains the basic rules for the usage of the Variant element in the composite identifier TrainID.

- **TrainID – Update Link Framework (Annex 8.3)**
This document contains the explanation of the usage of UpdateLinkMessage which serves primarily for indication and update of the relation between business object train and path.

- **TrainID – Case Reference Framework (Annex 8.4)**
  This document explains the framework for the usage of the Case Reference ID as the new identifier in TAF/TAP TSI.

- **TrainID – Object Info Framework (Annex 8.5)**
  This document explains the usage of the ObjectInfoMessage which serves for efficient information exchange on the content of the objects, primarily Train, Path and Path Request.

**Testing Framework with Example of PCS (Annex 8.6)**
These documents provide the template for the test agreements between the partners. It is not limited only to the TrainID – it can be used for other message exchange tests (Planning or Operations) as well. The example is provided with the RNE system PCS:
- Annex 8.6.1: Testing Framework document containing the test scenarios for PCS. Additionally to this document, the SOAP UI xml project file has to be used. The XML file, however, requires authorized access. For those who want to use it, the contact to SMO is necessary.
- Annex 8.6.2: Detailed test results list, again with PCS example.

**Test Cases with Identifiers (Annex 8.7)**
This is the Excel sheet containing test cases according to business scenarios in Planning, Re-planning (change management of objects Train and Path, “fine-tuning”) and Operations. The test cases are mainly provided by the stakeholders and coordinated within the TEG TrainID. Annex 8.7.1 contains the general list of test cases with the introductory explanation of the structure. The Annex 8.7.2 contains the simple test cases in the Short-Term Path Request process which will be used within the Joint Sector Pilot Program for Short Term Path Request and TrainID (see footnote 26).

- **TrainID – UML Model (Annex 8.8)**
The UML model is provided in the form of activity diagrams for all business scenarios given in the WG10 handbook as well as the object model and object lifecycle (state) diagrams. This UML model is not limited only to the identifiers, it can be used for the simple business cases in Planning, Re-planning (change management of objects Train and Path, “fine-tuning”) and Operations.

**Annex 9.1 Data Model for Reference Files**
The Class diagram is used from the Central Repository Files Database.

Within the functional data model (class diagram) the tables (classes) are described with their elements. The relations between the Tables are maintained. Elements are described by their Names and Type.
Update Message for Locations
The XML schema shows the message to be used to update the CRD for locations by National Allocation Entity or companies for Subsidiary locations for defined Subsidiary type code. **see xsd file in Annex 1, including this message**

Annex 9.3 K HMI for Maintenance of Location
The screen shows the draft User interface to update the CRD for update the locations by privileged users.

Annex 9.4 K Table of codes for Subsidiary locations (subsidiary type codes)

Annex 9.5 K Code structure for initial population of and manual Bulk updates
This structure can be used for those companies wishing to upload from existing databases (ENEE).

Annex 10.1 K Code lists
The export from XSD containing code list is provided. Any change to the code list will be registered in XSD and exported again from the XSD tool. Every code in the code list should have the explanation. In the annotation of the code list element, the source of the code should be written.

• Annex 10.2 – Code lists as annotations: MessageType and ErrorCode
Some of the codes are provided only as the annotation of the elements. The important examples are MessageType and ErrorCode

Annexes to Part B

• Annex 12.1 – Elements specific to actors
• Annex 12.2 – UML Model for Path Request processes
UML model was provided in the TAF phase 1 and adapted to the current messages in 2015. It is recommended to be used when planning the bilateral or multilateral communication in the Path Request process by using TAF/TAP TSI message framework (both mandatory as well as the optional sector messages).

Annexes to Part C Operations

• Annex 13
The annex document covers all operational processes diagrams, containing the TAP and TAF process diagrams relevant for chapter 13 to chapter 20.

Annexes to Part D

• Annex 20 – Glossary
The glossary was made within the TG4 in the Phase II of TAF/TAP by comparison of the Implementation Guidelines, WG10 TrainID Handbook and TAF/TAP legal text.